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The Actual State of the River Lea.

IT is impossible to form any true idea of the actual state of the River Lea, at Tottenham, from the correspondence which has recently occupied so large a portion of the daily papers. No subject deserves, and none is receiving, more public attention. But contradictory statements abound, as must always be the case when writers, even of unimpeachable good faith, write earnestly on a subject as to which they do not possess the technical knowledge necessary to give value to their observations.

The first point in dispute is how far the sewage works at Tottenham form the sole, or even the principal, source of the asserted pollution of the river. Edmonton, Ponder's End, Enfield, Waltham Abbey, Cheshunt, and other places drain into the Lea. Omitting Hornsey, which is nearer the outfall of the Lea than Tottenham, the Registration district contained 102,000 inhabitants in 1881; and the population of Tottenham, which stands for 46,000 out of that total, is now estimated to amount to upwards of 70,000 persons, so that at least two million gallons of sewage have to be dealt with daily at the outfall of the Tottenham sewers.

At a few chains more than half a mile up the course of the Lea from the Tottenham infall is Tottenham Lock, just below which the contents of the Catch-water Dyke enter the Lea. This culvert brings down the effluent from the sewage of Edmonton, which is treated by one of the processes of which the use of lime forms an essential part, the supernatant fluid being run through, or over, land provided for that purpose. It should be understood that, as far as the Local Government Board can be understood to have arrived at any opinion on the most perplexed question of modern times, it is to the effect that filtration, or chemical precipitation, followed by running through sand or gravel, is the best method now known for the treatment of sewage. Postponing, for the present, any remarks upon this view of the case, it is enough here to remark that the effluent from the Catch-water Dyke, although not in any way comparable as a nuisance to what takes place half a mile lower down, visibly fouls the water of the Lea at the point where it enters.

This infall is into the pound, or level section, of this canalised river, which extends from Tottenham Lock to Old Ford. The current through the pound is very slight, and the action of the wind brings matter from Tottenham into the upper part of the pound, no doubt, to some extent. Still, above the Tottenham works, and preferably close to infalls into the Lea, are to be seen daily rows of patient fishermen; although the only fish seen on a recent visit were dead roach and dace,—some of large size,—floating in the Lea. Below Tottenham the fishers state that there are no fish, but that statement is contradicted; so that we can only say that no fishers were seen there on a recent occasion.

The water of the Lea above Tottenham Lock, though somewhat muddy last week, was of a fair purity, as tested by the senses. And the test, if rough, is not to be despised. The water falls over the upper gate of the lock in a little sheet that emits no odour, and that does not render either dirty or offensive the dress of the observer, when blown over it as spray by the wind. The fish in this pound are said by the fishermen to be small. At all events, the water here is as uncontaminated as that of many of our rivers and canals as to which no complaint is made. Chemical analysis is, of course, desirable; but boaters, fishers, and bathers, are content with a much simpler analysis of their own.

Thus we find that the Lea enters the Tottenham pound in a state that certainly will not excite public reprobation. It is almost immediately fouled by the Catch-water Dyke; but it is difficult to say how far the condition at the head of the pound below the lock is due to this contributory evil, and how far to the working up from below. What occurs at the Tottenham infall is this:—

Two million gallons of sewage a day, more or less, are pumped up from the low-level sewer that receives the main sewage of the district, into a building, in the upper part of which they are mixed with lime and other ingredients. The liquid then flows into a subsiding tank. Of these there are five, of a capacity of between one-fifth and one-fourth of a million of gallons each,—a capacity arranged for many years ago, when the quantity of sewage to be dealt with was far less than at present. As it is, it is evident that tank-room for little more than half the daily supply is totally inadequate for the application of any process using lime for a precipitant, even apart from other great disadvantages of this mineral. Thus, in point of fact, the sewage flows from the mixing-tanks in at one end of a reservoir some 300 ft. long, from the opposite end of which it escapes in an overflow as a thin sheet of water,—water, however, which the senses declare to be only weak sewage. The colour is a pale-brown, and the odour that escapes, if an observer stand down the wind, is overpowering. Speaking, again, with the reserve due to a want of chemical analysis, it may be considered probable that two-thirds of the foreign matter of the sewage is the utmost that has been extracted in the works. This effluent runs directly into the Lea, and to the definite amount of pollution thus constantly in operation it is not difficult to ascribe a numeric value.

The nuisance caused to the neighbourhood by the sewage waterfall is, however, but a small part of that caused by the works. Assuming that two-thirds of the impurities are abstracted from the raw sewage, from three to four tons, precipitated by the chemicals employed, and mixed with an equal or larger quantity of lime and other ingredients, form a sludge, containing 80 per cent. of water. To describe the abomination baffles moderate language. Not only is it a concentrated and magnified nuisance,—for precipitation is the reverse of purification, except in so far as the effluent is concerned,—but it is one the daily disposal of which is a constant source of anxiety. And not only is this the case from day to day, but the outlook for the future is still more menacing. From 30 to 40 tons or upwards of this sludge is daily pumped into boats, and it is understood that, although the material is called, with some justice, a drug, it is put somewhere or other on land, for the value of the ammonia and phosphate it contains, as manure. But of the solid contents of sewage from 15 to 16 per cent. consists of common salt,—chloride of sodium. The ammonia is vaporisable, and if not taken up by vegetation will, at all events, do no harm to the land. It is otherwise with the salt, which must, to some extent, accumulate in the soil on which it is continually poured, with the final result of destroying all useful vegetation.

Such, then, is the actual state of things at Tottenham. The Lea, inoffensive (at least a few days since) as it flows over Tottenham Lock, is polluted immediately below by the contents of the Catch-water Dyke, and, half a mile lower, by what is equal approximately to the contents of from 600,000 to 700,000 gallons of raw sewage a day. At the same time the neighbourhood is infected not only by the odours from the overflow of "treated sewage" but still more by the creation of the foul sludge, the daily removal of which is a nuisance, a cost, and a danger; and the ultimate disposal of which is a problem that no one has cared to face.

We desire, on the present occasion, to keep entirely clear of any debatable matter, and now offer no opinion excepting as to the point, hitherto overlooked by all the advocates of sewage farming, of the accumulating salting of the soil on which sewage is placed. It is also a matter beyond the region of controversy, and

of no small importance to bear in mind, that deodorisation is not disinfection; that chemical precipitation stores up putrescible matter; that the admixture of lime, which precipitates as chalk, doubles the quantity and increases the foulness of the sludge; and that lime, though a clarifier, is not a purifier. It has a certain affinity for sulphur, but is generally inert as to the mischievous elements of sewage. In the A B C process, tried at Crossness; in the phosphate of alumina process (tried at Hertford); in the sulphate of alumina process (tried at Coventry and Nuneaton); in Whitthread's process (tried at Romford); in Hillé's process (now in use at Tottenham); in Holden's process, which was found, according to Mr. Burke ("Sewage Utilisation," p. 19), to increase the amount of putrescible matter in solution; in Goodall's process (abandoned at Leeds); in Hanson's process (also tried at Leeds); at Alton, Balsall Heath, Blackburn, Birmingham, Bromley, Burton-on-Trent, Bradford, Chester, Ealing, Harborne, Leicester, Leytonstone, Luton, Ormesby, Banbury, Cheltenham, Clifton, Coventry, Halifax, Hertford, Hitchin, Leamington, Leeds, Newcastle-under-Lyme, Northampton, Over Darwen, Oxton, St. Marychurch, Southborough, Tottenham (Higg's process), West Ham, and Worksop, processes employing lime for precipitation have been introduced, and either abandoned, as in the last sixteen places, or admitted to act "only as a palliative," yielding an impure effluent, and a nearly valueless manure. Per-salts of iron have been used as precipitants, but "in practice," Messrs. Robinson & Melliss say, "are found to be too expensive." Experiments on a small scale have been made with various processes, such as Higg's, Dale's, and Dimsdale's, at Croydon, and have been reported on unfavourably. Lenk's process, on a small scale, was tried with good sanitary results, but was very costly. Hydrate of lime, chloride of lime, and alum, have been tried at New Shoreham, and "there are many other patent processes for treatment of water-carried sewage by precipitation, but none of them have been put into practical use."

In a word, all the processes above indicated have been liable to the following grave objections. They have entirely failed to disinfect the sewage matter, and, for the most part, have only imperfectly removed it from the effluent water. They have largely increased the quantity of foul deposit, have kept it in an unmanageable form, and have left it loaded with putrescible matter. Their action in producing manure has been chemically very doubtful, and financially, for the most part, disastrous.

In face of the result of the experience of more than a quarter of a century, it can hardly be seriously contended that it is by any process involving the use of lime, or aiming at the precipitation and storing up of the putrescible contents of sewage, that there is the slightest probability of arriving at a solution of the most difficult chemico-engineering problem of the nineteenth century.

FOUR MIDDLESEX PRISONS, AND THEIR SITES.

IN the *Builder* of 15th August last (page 214, *ante*), we adverted to the previous Tuesday's debate, upon the proposals for sale of the prison sites in the Housing of the Working Classes Bill. The Bill, as it so happened, became law on the 14th of that month, and stands as 48 and 49 Vict., c. 72. Its disputed third clause now runs thus:—"In the event of the removal from their present sites of Millbank Penitentiary or Pentonville Penitentiary, it shall be lawful for her Majesty, on the recommendation of the Commissioners of her Majesty's Treasury, and subject to such conditions as they may think reasonable, and in the event of the removal from its present site [*sic*] of Coldbath Fields Prison, or House of Detention, Clerkenwell, it shall be lawful for the justices of the peace for the county of Middlesex if the justices think fit so to do, to sell and convey those respective sites or any part or parts thereof to the Metropolitan Board of Works, at a fair market price." Having already commented upon the fiscal and economical sides of the question involved by these sales, we may advantageously say a few words concerning the sites themselves. No one hitherto seems to have noticed how ambiguous is the phrase, "The removal from its present site of Coldbath Fields Prison, or House of Detention, Clerkenwell." Here one site only is specified; two distinct prisons are named. The former structure, now officially designated for all official purposes her Majesty's Prison, Coldbath Fields, is still, as its gateway bears witness, the Middlesex House of Correction (1866). The latter serves, and always did serve, for the Middlesex House of Detention: its portal opposite to Short's-buildings and St. James's-walk is thus inscribed: though formally entitled, under the newly-introduced order of things at the Home Office, her Majesty's Prison, Clerkenwell. We are informed that both establishments are designed to come within purview of the Act; in which case it would appear that the words "or House of Detention, Clerkenwell," should be construed in an additional rather than an alternative sense; and that they were inserted in the clause at the last moment without a corresponding change being made in the context.

Clerkenwell Gaol replaces the former New Prison, which had been built at the close of the seventeenth century on a site immediately south-east of the old Bridewell. At that time, and indeed for long afterwards, the gaol, together with the Bridewell, stood remote on the open and higher ground, between Spa, *antiquè* Ducking Pond, or Pipe, Fields, and St. James's (Clerkenwell) Church. To the north-west lay Cut-Throat-lane, renamed Corporation-row in 1774, and Bowling-green-lane. The slopes below were watered by the several springs* which gave a name to the River of Wells, an affluent of the Fleet. But the idyllic picture drawn for us by Fitz Stephen, coupled with the later favourite interludes and mystery-plays of the London skinners and the parish clerks, and the favour it had found with residents of quality (*teste* Malcolm) suffered a sorry change. To them succeeded the bear and bull baitings of the Restoration; to these again the no less robust and brutal encounters sung by Pope and Gay, until a lower stage of vice and dissipation was reached at Hockley-in-the-Hole,† and thereabouts, as portrayed by Fielding and Charles Dickens. The *Newgate Calendar* contains a circumstantial account of Jack Sheppard's escape, together with his sweetheart, Edgeworth Bess, from this New Prison. Harrison Ainsworth gives the morning of Whitsun Monday, May 25, 1724, as the date of that exploit.‡ Both mention the lofty Bridewell wall which had last to be surmounted. The old Bridewell remained until 1804; the New Prison was rebuilt 1774–5; and having been enlarged in 1818 was entirely rebuilt in 1845, on Grindsell's tender for 28,684*l.*, after the plan of the Model Penitentiary at Pentonville, by Mosely. That portion of the existing outer wall which faces the opening into St. James's-buildings, between Nos. 52 and 54, Corporation-row, bears traces of reconstruction after the memorable and fatal attempt at rescue, on December 13, 1867, of the Fenians Casey and Burke. So much of Rosoman (or Rosamond) street as, extending from Clerkenwell-close to the junction of Bowling-green-lane with Corporation-row, bounds the south-western wall, was once known as Bridewell-walk; Woodbridge-street, along the north-eastern wall, is a modern continuation of that thoroughfare from Aylesbury-street, Clerkenwell-green.

Until the new thoroughfare § shall be constructed from Gray's Inn-road to the Angel in Clerkenwell (for it is not in Islington), the wayfarer descends Little Gray's Inn-lane by the General Wolfe and the Holborn Workhouse or Elm-street, to the foot of Mount Pleasant. Passing the once famed Two Blue Posts and the Old Cheshire Cheese taverns to his right hand, two mural tablets dated respectively 1720 and 1737,—this one against the wall of No. 41, and that against the wall of Nos. 55 and 57, Mount Pleasant,—will remind him that the names of the buildings have been changed. They were lately known as,—in the order given,—Dorrington-street, Baynes-row (or street), Coldbath-square, and Cobham-row. Coldbath-square at first consisted of the two rows that stand nearly north and south: in the space between, originally Sir John Oldcastle's field, is the chalybeate spring whose specific virtues one Mr. Walter Baynes, of the Middle Temple, and owner of the property, discovered in 1697. The bath-house occupies its old position, being approached by a passage between Nos. 25 and 26 in the block which was latterly placed down the square in alignment with the former houses. These circumstances are confirmed by the order in which the houses in Coldbath-square are yet numbered. Northwards of the square lay a marshy waste, or public laystall (*vide* the neighbouring Laystall-street), covered with rubbish and refuse heaps, known as Gardiner's Fields or Farm. Appertaining to the Jervoise estate, it lay on the confines of St. Pancras parish. Between the two parishes ran the turbulent, ill-used, noisome Fleet, itself traversed by wooden pipes for conveying water to Gray's Inn-lane from the New River Head. The river's course is distinctly marked by the hollow of Mount Pleasant.* For the freehold of nine acres the county magistrates paid to Thomas Clarke Jervoise 4,350*l.*; and having raised an additional sum of 62,000*l.* by tontine shares valued at 100*l.* each, on security of the rates, employed Charles Middleton upon the new works (1794). Just as in the parallel instance of Millbank, the soil proved little better than a morass. The fabric cost nearly 66,000*l.* for but 232 cells; a portion, however, of that amount is said to represent illegitimate gains to some or other of the parties engaged, whilst in other respects much of the work done was highly discreditable. Public humanity had been awakened by the voice of John Howard, who had died four years previously. Nevertheless, there lingered many an old abuse, whilst the prejudice against solitary confinement inspired one of the five stanzas which Southey contributed to Coleridge's "Devil's Thoughts." Enlarged in 1830 on such a scale as to render it the finest as it is one of the best appointed gaols in the kingdom, and conspicuous for its great treadmill, this prison is used for offenders condemned to hard labour for periods generically styled short sentences. It had narrowly escaped material injury in the riots of July, 1800, constituting an especial object of odium by name of the New Bastille. Already have some of the prisoners been removed to Pentonville, and before many weeks have expired its retributive purpose will know it no more.

In speaking of Howard and of a time when Elizabeth Fry, Romilly, and Buxton had not begun their labours, we recall Bentham's words:—"Instead of doing what so many could do if they would, what Howard did for the service of mankind was what scarce any man could have done, and no man would do but himself." To Bentham may be fairly ascribed no small share in settling the plan which forms a leading feature of Millbank Penitentiary. He had put forth his scheme for what he called a panopticon or inspection house. His views found favour with the authorities; the separate-confinement system, in ranges of cells so situated that each group shall radiate from one commanding centre, is since sufficiently familiar. In 1799 James (Cecil), seventh Earl and first Marquess of Salisbury, sold to the Government (for, it is said, 12,000*l.*) a plot of some sixteen acres by the riverside, between Peterborough, latterly Grosvenor, House (north), and the Halfpenny

* Such as the Rad, the Tod (or God), the Fagge's, the Skinners', and the Clerks' Wells; to which may be added Black Mary's Hole, *olim* Blessed Mary's Well, near Bagnigge Wells.

† The now Ray-street: the Coach and Horses Tavern, facing Back-hill, is styled late Hockley-in-the-Hole. Like to many a tavern with similar surroundings, it boasts of associations with Jack Sheppard and Dick Turpin.

‡ Jack Sheppard, Epoch the Third, chap. iv. But the 25th of May of that year fell on a Sunday.

§ See the *Builder*, vol. xlvii. (December 13, 1884), p. 789.

* *Vide* in Hone's Table Book, vol. iii., cols. 75, 76, an interesting woodcut showing the Fleet as it here appeared in 1825: being the first open view thereof nearest to London.

Hatch (south).* Millbank takes its name from the Abbot's Mill that once stood at the foot of Great College-street, being served by the Mill Ditch, a channel of the Aye brook or Tyburn. The bridge by which the mill, with the river-side walk beyond, was approached from St. Margaret's-lane (Abingdon-street) is said to remain some feet beneath the present road. The Abbot's Garden and Monastery Garden abutting against that walk were identical with part of the site we speak of, and lay in the southern corner of the City of Westminster, as limited by King Eadgar's charter. South-west of the ground,—now comprised within St. John's Parish,—flowed the Aye brook, from the neighbouring osier-beds and marshes of Pollenstock and Bulunga Fen, into its river estuary at Merfleet. The Aye brook had formed a boundary, in part, of the original parish of St. Margaret, as defined in that charter. Strype alludes to the low level and consequent unhealthiness of this quarter, natural disadvantages which all the builder's art has failed to overcome. After considerable delay the "Penitentiary House for London and Middlesex" was opened for the custody of convicts, having been erected by Harvey at the large cost of nearly half a million of money. Its capacity, great as it is, is materially enhanced to the eye by the curtains that connect the several terminal towers.

From the North London Railway, as it crosses the Caledonian-road, a good view presents itself of the imposing entrance gateway into Pentonville Penitentiary. That prison forms the embodiment of the "silent" and "solitary" methods of confinement. In 1832 a commission visited America to inquire into and report upon the much-vaunted system of isolating prisoners as practised at Philadelphia. In the result, the late Earl Russell passed an Act, in 1839, for legalising this form of durance. Thereupon a site was chosen just eastwards of Copenhagen House, and on it, in 1840-42, was constructed the existing Model Prison,—as it long continued to be called,—at a cost of about 90,000*l*. In the days of transportation to the colonies, all convicts doomed thereto were sent hither to work out their preliminary probation, and on terms of the strictest rigour. Here within the last few years as many as 1,000 criminals at a time have been confined expiating their offences in sentences all exceeding five years in length. Copenhagen House was situated between the former Maiden and Hagbush lanes, close to, if not identical with, the position of the Cattle Market clock-tower. The course of Hagbush-lane cannot be easily determined within the limits of this article; albeit, it would seem to have here followed that part of Caledonian-road which is overlooked by the Pentonville Prison. The prison, we should add, whilst within the parish of Islington, is some distance from Pentonville, properly so called.

*Belgrave House is marked in Horwood's map, 1799.

NOTES.

AN incident of much more than passing interest to the archæologist and architect has just taken place, in the signing by King Humbert of a decree to establish a Byzantine Museum in the ancient city of Ravenna, which stands in melancholy grandeur on the western shore of the Adriatic, far from the hurly-burly of the nineteenth century. Ravenna, indeed, is far more Byzantine than Byzantium itself, or what was once Byzantium, but is now the modern capital of Constantinople; and there is no city in the world which contains so many traces of the later Roman life, when it was the famous Augustan port of Classe, commanding the commerce of the Adriatic and Greece, long before Venice was heard of. Its culminating point of prosperity was at the era when the Huns and Goths rose to power, and although these latter were considered barbarians, the most beautiful churches in Ravenna were erected by the Gothic Emperor Theodoric in 493. At the reaction under Justinian, when the Roman influence began again to be felt, the city was adorned with new churches, and especially those of San Vitale, with its glorious mosaics, and San Apollinari. It may, indeed, be said to be the mausoleum of the ecclesiastical architecture of that period, a characteristic which it retains at the present day, and which is partly owing to the fact of the main line from Bologna to Ancona passing at a considerable distance from it (although it possesses a branch), and partly, that it is situated amongst marshes somewhat notorious for their malarious influences. In its way, Ravenna may be said to offer as much interest as Pompeii and Herculaneum, and although it has never been subjected to the sudden catastrophes which overtook these latter places, it has witnessed the gradual sinking of the soil, and the covering of alluvial layers probably conceals quite as many art treasures as are visible above ground. Systematic investigation and excavation would, doubtless, bring to light a vast amount of archæological treasure, and it is to be desired that the Italian Government should, ere long, set such an undertaking on foot.

IT is to be hoped that the various signs which, according to the opinions of practical business men, seem to point to a revival of the iron and steel trades, may not prove fallacious, for, although it is only one out of many staple industries, it is *the* one which invariably leads the way to either prosperity or depression. If the rumoured treaty between Great Britain and China becomes *un fait accompli*, we may safely look forward to a "boom" in several of our trades, particularly if the political horizon remains as free from dangerous complications as it has been for the last three months or so. China is a vast region, almost totally *inexploité*, as far as foreign arts and manufactures are concerned; and as the Chinese are essentially an imitative race, the throwing open of that country to English influence, and the expressed intention of the Chinese authorities to commence a railway system, instead of resisting it as before, will give our commerce a start such as it has not had for years, and the iron and engineering trades will be the first to feel the impetus. The proceedings of the Iron and Steel Institute, just concluded at Glasgow, show that, whether business is brisk or dull, the scientific element is always on the increase, and that all the efforts of the modern iron-masters are directed towards obtaining a perfect iron and steel, combined with the utmost economy. The most striking example of this is in the recovery of the tar and ammonia from the waste gases,—things which the iron-master of a couple of generations back would never have dreamed of; but its value is illustrated by the fact that it causes a saving of about 1s. 6d. in the ton of coal consumed, or 3s. in the ton of iron produced. Another great fact is, that by regulating the quantity of silicon in pig-iron, an additional strength of something like 10 per cent. can be obtained, with increased softness, for castings. Silicon pig has hitherto been rather a drug at iron-works, and has been always thrown back into the furnace, whereas it now seems that it forms the most valuable kind of iron for foundry purposes. The substitution of steel for iron is greatly on the increase, mild steel having practically displaced iron in boiler-making, ship and bridge building, and it is even being used at the present time in the construction of a block of warehouses in London, requiring a total of over 8,000 tons in the form of castings.

THE number of historical mansions in the market continues to increase, and offers plenty of chances to those purchasers who like to combine the comfort and dignity of a landed estate with the associations of antiquarian conservatism. Such a one is Ankerwycke, a well-wooded property of some 700 acres, below Windsor on the Buckinghamshire side of the Thames, which bounds it for over two miles. Few places, indeed, are identified so conspicuously with the salient landmarks of English history, for, included in the grounds, is the island of Magna Charta, on which King John granted the liberties of the land to his Barons in 1215, or, as Matthew of Paris hath it, "prope Villam de Stanes, juxta flumen Thamasiæ, in quâdam insulâ." This seems to dispose of the oft-disputed question as to whether the charter was signed on the island or on the adjacent Surrey meadow of Runnymede; but, at all events, a one-time lord of the manor decided it in favour of the former in 1834, and built a room close to the landing-place, in which he deposited a copy of the charter. At the same time he erected the picturesque cottage residence close by, so well known to boating men. This, however, is not the only antiquarian interest attached to Ankerwycke, for near the residence are the remains of a Benedictine nunnery founded *temp.* Henry II. by Sir Gilbert de Montfichet, which met with much gracious favour in a subsequent reign, Henry III. having confirmed by a charter all the donations made to it. At the Dissolution it came into the possession of Lord Windsor. Another object of note is a famous old yew tree, which, according to tradition, witnessed many true love meetings between Anne Boleyn and the royal Blue Beard, Henry VIII.

AN interesting discovery has just been made at Bonn. In digging at the foundations of a portion of the Cathedral Church, for purposes of restoration, the workmen came upon an inscribed votive tablet rather more than 6 ft. long and 3 ft. wide. The tablet has been presented to the provincial museum of Bonn. The upper part of the inscription is unhappily not quite complete, as the top of the stone has been broken away. What remains cannot as yet be completely made out, as in places the letters are rendered illegible by a hard coating of mortar. Enough however appears at the first reading to show that the stone is of the highest historical importance. The name of the Emperor Antoninus Pius can be clearly made out. The stone is a votive offering in his honour, dating therefore A.D. 138–161. The name of the Roman governor of the town, Claudius Julianus, by whose order the stone was set up, also appears. Claudius Julianus is already known from monuments and literary sources. In all probability the stone belongs to the last year of the emperor's reign, A.D. 160. Our account is taken from the last issue (Sept. 5) of the *Berliner Philologische Wochenschrift.*

THE Railway and Canal Traders' Association propose a fresh test question for Parliamentary candidates in connexion with the objects of their society. The council considers that candidates should be asked their views upon the unjust preference shown by the railway companies to foreign traders, and the charges for station accommodation levied by the companies in addition to their authorised maximum rates, and is of opinion that no candidate should be supported unless pledged to protect the interests of railway freighters in relation to such subjects. This association has been very energetic in endeavouring to promote the interests of freighters, and the necessity for candidates to inform themselves upon this subject and to interest themselves in it is apparent. But it is, perhaps, doubtful policy to add this to the already long list of test questions. It is pretty certain that a large proportion of the hundred or more members representing the railway interest in the House of Commons would hesitate to give a favourable reply to these questions,—or, at least, to give an unqualified pledge, whether interrogated by friends or opponents,—and the result might be a loss to Parliament of some useful and experienced members. By all means let the objects of the Association be constantly kept before the public and Parliament, but persistence in forcing it upon candidates may in some cases be somewhat injudicious.

A FINE statue has recently been acquired by the authorities of the Louvre. It represents a god leaning against a tree, and holding in his hand a lyre formed from a tortoise-shell. It has been placed where the famous Artemis of Versailles used to stand, a group which was some time ago removed to the new La Caze Hall. The new statue cost 16,000 francs.

THE proposed International Exhibition in Edinburgh, next year, may now be held as in the way of being fulfilled. The guarantee fund has been subscribed to within 2,000*l.* of the required amount, the committee have received promises for more than the balance, and the Town Council have granted the use of the West Meadows as a site for the building. The site is in all respects a suitable one, within the city bounds, of easy access, surrounded by belts of fine trees, and comprising an extent of twenty acres. The space will not only afford room for the Exhibition buildings, but for those accessories which are now looked for as a necessary accompaniment of such exhibitions, and the clumps of trees and shrubs which diversify the flat surface of the ground are so situated as to be effectively utilised as adjuncts to the appendages to the Exhibition, one of which is to be a bit of Old Edinburgh, after the manner of that of "Old London" at the Kensington exhibitions. Already a number of applications for space have come from various Governments and firms in this country, and it is expected that many of those who may come to the American and the Indian and Colonial Exhibitions to be held in London will find their way to Edinburgh. Should the Exhibition prove a financial success it is hoped that from the surplus funds a permanent site may be obtained for future exhibitions.

FORMER visitors to the city, who renew their acquaintance with it during the Exhibition year, will find new objects of interest. The new City Cross,—a replica of that described in Scott's "Marmion,"—which is now being vigorously carried on, will then be completed; the Museum of Science and Art will also be completed so far as regards the exterior,—the operations in connexion with the west wing being now in full swing; and the foundations for Dr. Rowan Anderson's building for the Historical Portrait Gallery and Antiquarian Museum are now laid, and some portion of the façade will doubtless be in such a state as to enable one to conceive the effect of the whole. This will be one of the most striking buildings in the city, not only as regards style, but also as regards the material chosen, which is red sandstone. This material has hitherto been used in Edinburgh merely for shafts and minor details, but where, as in the Hydropathic establishment at Peebles, the whole body of the building is built of it, the effect is rich and striking.

CONSIDERABLE attention has lately been drawn to the supply and consumption of copper, an article of which the production is of the greatest possible interest, not only to the building trades, but to the community at large. Indeed, the latter section of society should be more interested in the question than the wholesale consumer, who, of course, participates in the fall of prices whenever these occur, as at present; but the retail purchasers, for their part, gain no advantage, as everybody knows who wishes to buy copper and brass household goods. As a matter of fact, both the production and consumption of copper have marvellously increased of late years, the former having risen from 149,156 tons in 1879 to 208,313 in 1884. The largest contributor to this increase is the United States, which yielded about 40,000 tons over and above the output of 1879. The richness of America in this respect may be gathered from the figures of last year, which were 63,950 tons, Spain and Portugal coming next with 43,664, and Chili with 41,648. From these the drop is very marked, Germany yielding only 14,782 tons, and Australia 13,300, all the other producing countries being on a very small scale. Japan, however, shows 6,000 tons, which looks as if she might come to the fore in the future, the production of 1879 being but 1,900 tons. The consumption of copper in England and France is greatly increased, there having been, in round numbers, 551,000 tons used between the 1st of January, 1881, and the 1st of August, 1884, while the receipts were only 547,000 tons. This, of course, means that stocks have been reduced to make up the deficiency, the average condition of stocks being from 50,000 to 60,000 tons, while at the end of last year they were estimated at only 40,000. What is more to the point for consumers, is the fact that prices have rapidly gone down between 1881 and 1884 from 62*l.* per ton to 42*l.*, by far the lowest price ever known, and at least 30 per cent. below what the trade has hitherto considered safe and moderate. If stocks again accumulate (as they are beginning to do now), prices will probably rise, for this reason,—there are comparatively few really paying mines, but a great number of small concerns which can only get along when times are good and prices high. If the present low prices continue, many of these will probably go under water, lessening the total production, and throwing it more into the hands of the few large producers. Still, it is very unlikely that the former high prices will ever again prevail, and it will be wise for the retail merchant of copper and brass goods to carefully review the situation, and substitute a more moderate rate for the present high and arbitrary one. If they lower prices in proportion to the value of the material, they will soon find an enormously increased demand on the part of the purchasing public.

THE Archæological Society at Athens is about to undertake the completion of the excavations at Olympia. As is well known, the Germans, owing to failure both of time and funds, were unable to complete the work they had begun; in particular, a large portion of the northwest corner of the plain, containing the foundations of the great gymnasium, had to be left unexplored. All the same, German authorities hold,—and very confidently express their opinion,—that little of importance remains to be discovered. We fear they are right, but still hope they may prove wrong.

WE learn that Mr. P. Kabbadias has been appointed to fill the place of Director of Antiquities at Athens, left vacant by the death of Mr. Stamatakis. Mr. Kabbadias received his archæological education in Germany, and brings to his work the sound basis of professional training, as well as patriotic enthusiasm. He is already well known to the archæological world by researches published in the *Athenaion* and *Ephemeris Archæologike*.

THE Trades' Union Congress seems more than ever disposed to lapse into an organisation for the discussion of party politics and the recommendation of class legislation. This latter charge would, no doubt, astonish the members of the congress, whose notion of "class legislation" is legislation carried out in the interests of any class except the artisan, while legislation in the interest of the artisan is in the interest of the State: for the trade union of to-day ejaculates its "*L'état, c'est moi*," with as much emphasis as any irresponsible monarch. The President's address contained some of the most original recommendations for promoting the national welfare that have been heard of. The main point was the establishment of an eight hours movement, on the ground that many now unemployed would find employment under the more restricted time of productive labour, more hands being employed to do the same work. In what way this is to contribute to the prosperity of "the State" is not very apparent. We are constantly, and even pugnaciously informed that the whole well-being of the country depends upon the artisan and the productive work which he accomplishes. But if the country is in a bad way, let us do less work and all will come right! In a subsequent discussion much fault was found with the Government for their manner of appointing additional inspectors of mines, by compelling them to pass an examination, and stopping out working miners who wished to be inspectors and could not pass the examination. It is fortunate that the Government still retain an old-fashioned prejudice in favour of appointing men of some general culture and scientific acquirements for such important and responsible posts. What sort of logic and impartiality of judgment we should get from promoting the man "from the pick's point" to the post of inspector, we may gather only too well from the tone and temper of much of the speaking at the Congress.

LIVERPOOL AUTUMN EXHIBITION.

THE fifteenth annual exhibition under the auspices of the Liverpool Corporation opened to the public on Monday, the 7th inst., and is, on the whole, fully equal to those of preceding years. There may not be any picture of such surpassing merit as to monopolise the attention of visitors, but the class of work is in general of a high order, and it is satisfactory to see that the number of provincial and local exhibitors is on the increase. The number of works of art comprised in the catalogue is 1,462.

The London galleries, as usual, contribute considerably to make up this total, and among those which will prove old acquaintances to the visitors of this year's Royal Academy, may be mentioned the following:—"Music" (a frieze), Sir F. Leighton, P.R.A.; "Œnone," P. H. Calderon, R.A.; "The Rapids of Niagara," Colin Hunter, A.R.A.; "Victory," W. H. Overend; "Don Quixote and the Galley Slaves," J. E. Hodgson, R.A.; "When the Children are Asleep," Thos. Faed, R.A.; "Absolution for the Lost at Sea," &c., A. C. Gow, A.R.A; "Done Work," W. B. Davies, R.A.; "The First Prince of Wales," P. R. Morris, R.A.; "Ulysses," &c., H. Mann; "Queen of the Tournament," F. W. W. Topham; "Cup and Ball," C. E. Perugini; "John Knox at Holyrood," W. P. Frith, R.A.; "Found," H. Herkomer, A.R.A.; "William III. at the Battle of Landen," Ernest Crofts, A.R.A.; "The Royal Fugitive," D. W. Wynfield; "After the Battle: Arrival of Lord Wolseley and Staff at the Bridge of Tel-el-Kebir at the Close of the Action," Mrs. Elizabeth Butler. Among the leading works from the last Grosvenor Gallery exhibition are Mr. Watts's "Love and Life," and Mr. Mitchell's "Hypatia," and Mr. Walter Crane's fine decorative design, "Freedom," to which we have before referred. As we have already noticed the pictures of the late Royal Academy Exhibition, it is unnecessary to mention them further here, but it will be seen that Liverpool has secured a very large share of the works of the London artists of the year.

Among the more important works are two, Nos. 174 and 175, by Mr. G. F. Watts, "Love and Life," which was recently at the Grosvenor Gallery, and "The Minotaur." These pictures are hung side by side. The latter, which has never before been publicly exhibited, represents a hideous beast with bull's body and head, and lion's claws, under one of which it crushes an unfortunate small bird. These two works are intended to form an allegory which the artist in a note says "explain his idea of the real mission of art, not to amuse but to illustrate and embody the mental form of the beautiful and the noble, interpreting them as poetry does, and to hold up to detestation the bestial and brutal." His aim is, no doubt, a very noble one, and in these two works the *motif* of the contrast is obvious enough, much more so than that of "Love and Life" by itself; but the idea of painting "with a moral" has its artistic dangers, which have already shipwrecked Mr. Watts more than once.

Among other figure and historical pictures, many of them deserving of more special reference than our space can afford, are Mr. E. H. Corbould's "Death of Turcitin" (No. 804 in catalogue), an elaborate watercolour, clever in execution, but wanting in power; and "Wyclif on Trial," a work by Mr. Ford Madox Brown, where the scene is laid in the Lady Chapel of Old St. Paul's, London. The style is somewhat hard and realistic, and the architecture rather feebly drawn; there is also throughout an absence of definite light and shadow. "Motherless," by R. C. Hutchinson (No. 1,007) is a large picture of a family of cottage children. A highly-finished and cleverly-executed work by Mr. Haynes Williams, called "An Interruption in the Dance," may also be noted.

There are not many portraits, but the few are generally good; and among them we were again particularly struck with that by Mr. Stuart Wortley (1,076), of "Maude, Daughter of Chas. Waller, Esq.," which we briefly alluded to in our notice of the Grosvenor Gallery this year. The child is dressed in a buff frock, with dark brown belt, and with a perfectly plain background. This simple and unaffected, but refined, little picture, is one of the most successful portraits

of girlhood we ever saw, and marks a decided step in the work of its artist.

There is also a charming cabinet-sized picture by Mr. J. H. Henshall (which he calls "Thoughts"), of a girl with a book in her hand sitting in a library, and with the most perfect expression of "thought" in her pretty and well-drawn face,—a most fascinating figure.

Besides the landscape called "Found,"—purchased under the Chantrey Bequest,—there is a second landscape exhibited by Mr. Herkomer (1,027), "The Fir Warmth of Spring." With very considerable power, especially in the drawing of the rocks in the foreground, it is not, perhaps, as striking as the first named, but it is no doubt a fine picture. We looked round, however, for some of his portraits, and cannot say that we felt their absence entirely compensated for, even by the presence of these undoubted evidences of the artist's ability as a painter of mountain landscape.

No. 1,008, "Wintry March," by W. L. Picknell, is a moor scene with gorse and bushes in foreground and dark firs on the left. The distances are very true in tone, and the blowy grey sky looks as if it was travelling. This is, perhaps, the best landscape in the exhibition, but why call it "Wintry March"? Sometimes there are snow and ice in that month, whereas here all is green, and the gorse showing itself early.

No. 930, "Yon Burn Side," by G. W. Johnstone, is a thoroughly good transcript of nature in one of her pleasantest phases. Bright and sunny, and true in tone, it is a much more pleasing picture than many larger and more pretentious landscapes. Of this class may be also mentioned No. 937, "Morning in Early Spring," J. W. North, R.W.S.; 954, "Summer, Dutch Landscape," W. B. Tholen; 1,101, "The Close of a Rainy Day," J. Horace Hooper; 992, "Salmon Stream, Perthshire," Wellwood Rattray; and others.

Among the water-colour landscapes which are particularly good, are six drawings "Reminiscences of the Vyrnwy Valley," most of them pretty bright transcripts of Welsh scenes, and one treated as an evening effect. These are by Mr. Peter Ghent (a Liverpool artist), and have been bought by the Liverpool Corporation as possessing a sort of historic interest, illustrating the site of the New Liverpool Water Scheme. Mr. Thomas Huson, also a Liverpool man, has some good drawings, among them being "The Burning of the Liverpool Landing Stage, July 28th, 1874," a clever effect of light and shadow. This picture (in oil) has been presented to the Corporation by the Rev. J. Miles Moss.

Several other Liverpool artists should be honourably mentioned, especially as water-colour painters, among them Messrs. A. Cox, Isaac Cook, Finnie, Pedder, George Cockram, and others.

The Impressionists are strongly represented. No doubt there are in some of their pictures indications of genius, but the evidences of absurdity are too often still more apparent. Take, for instance, the picture of Mr. Thomas Millie Dow, of "Hudson River," where the lower part of the picture (foreground and middle distance) is simply indicated by colourless and ghostlike forms resembling the first rubbing-in of details about to be painted. The public have impressions as well as artists, and we believe that the impression of a very large proportion of intelligent spectators in these cases would be that if the artist would kindly take the trouble to finish his picture the effect would be greatly improved. One peculiarity of these half-finished works of art is that they are generally very sumptuously got up as to their mounting, &c.:—

> "And if their picture we are forced to blame,
> We'll say most handsome things about the frame."

With respect to the architectural drawings in this exhibition, they are neither very numerous nor very important, though there appear to be some good designs and drawings among them. If we do not give them the amount of notice that might be expected, we beg to say that they are seen under great difficulty and to great disadvantage, hung as they are on a staircase and entrance-lobby, and it is impossible to give them the attention they deserve from the constant disturbance by the passing and repassing of those coming in and out of the Exhibition rooms. Moreover, they are many of them hung so high that the details are lost. Among those that are hung may be mentioned a Design for Liverpool Cathedral, view from south-east, by Mr. R. P. Pullan (a Gothic design with no very novel features, and hung so inconveniently that its detail cannot be judged of); Institute and Baths, Tamworth, by Messrs. Douglas & Fordham (a "Domestic Gothic" design possessing good character and detail, with half-timbered gables); a Design for Memorial Church at St. Petersburg, by Mr. R. P. Pullan (a Byzantine design, with dome); Board Schools, Webster-road, Liverpool, by Messrs. C. O. Ellison & Son (Cottage style, showing long front, and half-timbered gables); Business Premises for Messrs. Litherland & Co., by Messrs. C. O. Ellison & Son; New House, Oxton, Cheshire, by Mr. D. Walker; a Residence in Sefton Park, Liverpool, by Mr. Geo. Rushforth; House in Sefton Park, by Messrs. H. & B. P. Fry, &c. An Interior from the Church of St. Madeleine, Troyes, is a fine water-colour drawing, by Mr. C. G. Moundcell; another of the "North-east Chancel, Manchester Cathedral," is contributed by Mr. Alfred Goodfellow; and there are some designs for ceiling decorations by Mr. J. D. Crace, &c.

There are some good pieces of sculpture, including "Ruth and Naomi," by Mr. Warrington Wood. A terra-cotta bust of Mr. Finnie, the painter, is exhibited by Miss Evangeline Stirling, who is a Liverpool artist.

THE ARCHITECTURAL ASSOCIATION.

VISIT TO GUILDFORD.

THE Architectural Association made their fifth Saturday Afternoon excursion on the 5th inst., to Guildford, under the guidance of Mr. Cole A. Adams.

The first building visited was the parish church of St. Mary, in Quarry-street. The position of this church on the slope of the hill is very picturesque, and the steep slope of the site has been the cause of raising the floors of the chancel and two chapels on either side some 4 ft. above the floor of the nave and aisles. This church was restored by Mr. Goodchild in 1863, but still presents a great many interesting features. It consists of a nave, 17 ft. 3 in. wide, and two very wide aisles, the total width of the church being 55 ft. 6 in., and the length 90 ft. The two aisles terminate in chapels dedicated to St. Mary and St. John; these have apsidal ends. The chancel also formerly terminated in an apse, but it was pulled down and the chancel shortened and a square end built in order to widen the street. This was done, it is commonly reported by the inhabitants of Guildford, to improve the road used by George IV. in passing through the town! There is a low square tower at the intersection of the nave and chancel. The oldest part of the church is Norman, but considerable alterations were made in the thirteenth century, when the aisles were widened and the chapels and chancel built. The nave arcade has circular pillars with well-carved capitals; these support slightly pointed arches. The corbels supporting the roof are also vigorous specimens of carving. The Chapel of St. John, on the north side of the church, has a vaulted ceiling of Early English date, decorated with outline frescoes, which have now become very indistinct; they are attributed to William the Florentine, who lived in the reign of Henry III. The subjects are: On the north spandrel, St. Michael weighing the merits of a human soul, with a demon trying to depress the scale; on the south, an angel giving two souls to a horned demon. The south chapel is dedicated to St. Mary; in both of the chapels are large hagioscopes, the line of which proves how much shorter the chancel is, as they now do not look on the present altar. There are also some openings in the west wall of the church which are supposed to have been for worshippers who were unable to get into the church. In the south chapel are the remains of a curious Perpendicular screen which was formerly part of the confessional and stood in the Chapel of St. John-the-Baptist, which was then used as a vestry. The east end of the church, with the circular roofs to the aisles, is the most interesting part of the exterior.

The visitors then proceeded to the castle, which now stands in the grounds of a boys' school, but it has been purchased by the Corporation, and it is intended to make public gardens round the castle, and throw the ruins open to the public. There is not much remaining of architectural interest in the castle, the square Norman keep, about 70 ft. high, being the principal feature. There is, however, a good archway belonging to the outworks. The date of the keep is about 1150; it stands on a mound which is partly natural and partly artificial. The walls are 10 ft. thick, constructed of chalk-flint and sandstone, with a ragstone facing, having square quoins at the angles. There were three stories in the keep, the level of the principal floor being about 16 ft. from the ground. The entrance to this floor still exists, the date of the mouldings being Late Norman; the arch is circular inside and pointed outside. The hall measured about 26 ft. square. On the north side is the fireplace. The hall was lighted by three Norman windows; these have been repaired at some later period with bricks. In the south-west angle is a chamber that was probably used as an oratory; it contains some carving of a religious character and a Norman arcade. The staircase was at the north-west angle.

The next place visited was a curious crypt under 115, High-street, now used as a wine-vault. The local tradition is that this was an underground passage from the castle, there being a similar vaulted chamber on the opposite side of the street; but this is hardly probable, and it seems to be a great deal more probable that these were the crypts of religious buildings situate in the High-street.

The town-hall was next inspected. This is an interesting seventeenth-century building, the front being principally of wood. The projecting clock is an elaborate piece of work, and gives a very picturesque appearance to the building. The only rooms of interest in the building are the hall and council-chamber. The hall contains the portraits of Charles II. and James II., by Lely. The council-chamber, which is panelled to the ceiling, and has windows opening out to the balcony, contains an interesting old mantelpiece, which was brought from Stoughton House, in the parish of Stoke. The carvings on the frieze are said to represent the four human temperaments,—sanguineus, cholerius, phlegmaticus, and melancholicus. Over the fireplace hang the javelin which is carried before the mayor when he walks in procession in the town, and the beadle's staff. The two historic staffs presented to the town are not kept at the Town-hall.

The party then passed to the Abbot's Hospital, calling on their way to look at a fine Jacobean staircase at Mr. Booth's house. The hospital, founded by Archbishop Abbot in 1619, for the support of one master, twelve brethren, and eight sisters, all being over sixty years of age, was the most interesting building visited. The entrance to the hospital is through a handsome gateway which leads into a small quadrangle, the master's room being on the right, and over the gateway the chapel and dining-room in front, and the men's apartments on the left hand and the women's on the right. The building is full of most interesting detail, and has been carefully preserved. The master staircase is a splendid specimen of seventeenth century woodwork, the string being elaborately carved. Each string is of different design, the newels, 7½ in. square, having richly moulded and carved tops, the handrail being carried on a ramped arcading the columns of which have Ionic voluted caps and richly-carved shafts. The door-frames are very interesting, having varied stops to the mouldings, while the doors are elaborately panelled. The room over the gateway, which was used by the Archbishop when he stopped in Guildford, has a good carved wooden mantelpiece, and is panelled throughout. There are some interesting sideboards and tables, and two chairs with stamped leather seats and backs of quaint design in this room. The pictures are portraits of Wycliffe and Fox. The room over this, called the strong room, was used to confine the Duke of Monmouth in after his defeat at the Battle of Sedgmoor on his way up to London. The Common Hall contains the original tables and forms, which are very solid and of good design. The fireplace is very good, and the old carved settle in front is the *beau ideal* of snugness. The chapel contains two stained-glass windows of Dutch character, which are stated to have been taken by Archbishop Abbot from the Priory buildings in the town. They are said to have been designed by Albert Dürer, but they are certainly not equal to his general work. The story is that of the patriarch Jacob, beginning in the west window:—1. Isaac telling Esau to get venison. 2. Rebecca showing Jacob how to supplant his brother. 3. Jacob with wife

and children. 4. Interview of Jacob and Laban on Mount Gilead. 5. Jacob in prayer.

The next building visited was the Grammar School, which was built in the early part of the reign of Henry VIII. The building has not much architectural interest. The jointing of the stonework is ornamented with chips of stone inserted in the mortar. The school-room contains the original desks for the head-master and ushers, with curious cupboards in the arms of the chairs for the books used in the school. The library contains the collection of Bishop Parkhurst, who died in 1574,—a not very large collection of books with the original chains attached for securing them to the desks.

The Church of the Holy Trinity was visited for the purpose of inspecting the tomb of Archbishop Abbot, who was buried in the church. The tomb is a good specimen of seventeenth-century design, the bases of the pillars being formed of books laid alternately so as to break joint. There are a few interesting tombs in the church. The building itself is a good example of eighteenth-century work.

STONE-WORKING MACHINERY AT THE INVENTIONS EXHIBITION.

IN a former issue we made brief mention of the exhibit of stone-dressing machinery shown by Messrs. Brunton & Trier at the Inventions Exhibition, and we then stated that we should return to the subject again. We now illustrate in fig. 1, one of the principal machines shown at the Exhibition. As, however, Messrs. Brunton & Trier show a lathe on their stand, we will follow the usual practice and deal with that first. The tool in question is only of moderate size compared to some made by this firm. It will turn posts 23 in. diameter and 6 ft. long as a maximum, whilst some of deep, can be taken with the machines in question, working with the rotating cutters, and this with a traverse of ½ in. a minute, the working making about twenty revolutions a minute. The accuracy with which columns and pillars can be made is, of course, absolute, and this, too, without the employment of highly-skilled labour. Perhaps, however, the greatest advantage is in the surface left. This is unstunned, as no percussive force is used in removing the surplus material. The surface, too, is so good that, as we are informed, the polishing can be done in less than a quarter of the time required for hand-worked stone.

The side-dressing machine to which we have made reference, and which is illustrated in fig. 1, is used for surface-dressing any kind of soft stone, such, for instance, as Longridge, Red Mansfield, or Dumfries. The reason it is not used for granite is on account of the difficulty of holding the latter stone securely, so that it will not yield to the side pressure of the cutters. On this account the very hard stones have to be dealt with by a top dresser. The machine consists of a massive vertical standard carrying the slide in which the chuck-shaft revolves. Fig. 2, stance, in the machine in question the track is 2 ft. in diameter, and the cutters are each 8 in. in diameter. If the chuck runs at 300 revolutions a minute, the rotation given to the cutters by the geared wheels will be 900 turns a minute. The parts of the machine must, of course, be accurately designed, and in such a case there is no attrition on the cutters at all, excepting that which is due to the traversing of the stone on the table. This, however, is very trifling in extent, and produces no appreciable heating, whilst the cutting edge lasts a very long time. The speed with which the cutters pass over the stone without causing sparks is very remarkable,—2,000 ft. a minute is, we understand, a usual speed, and, indeed, it is said that the higher the cutting speed the more effective is the machine. The chuck spindle is driven by the belt pulley on the opposite side of the standard, the driving shaft for the cutter-gearing (marked *k* in fig. 2), which revolves within the hollow chuck

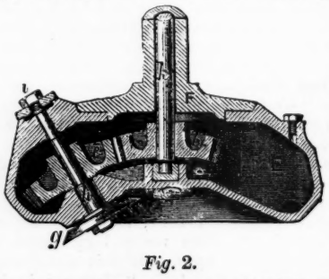


Fig. 2.

spindle, is also driven by a smaller belt pulley, shown in our illustration. The spindles are mounted in a slide or saddle, as shown, and this is given a vertical movement by means of the leading screw and bevel gearing shown, the latter being actuated in either direction by

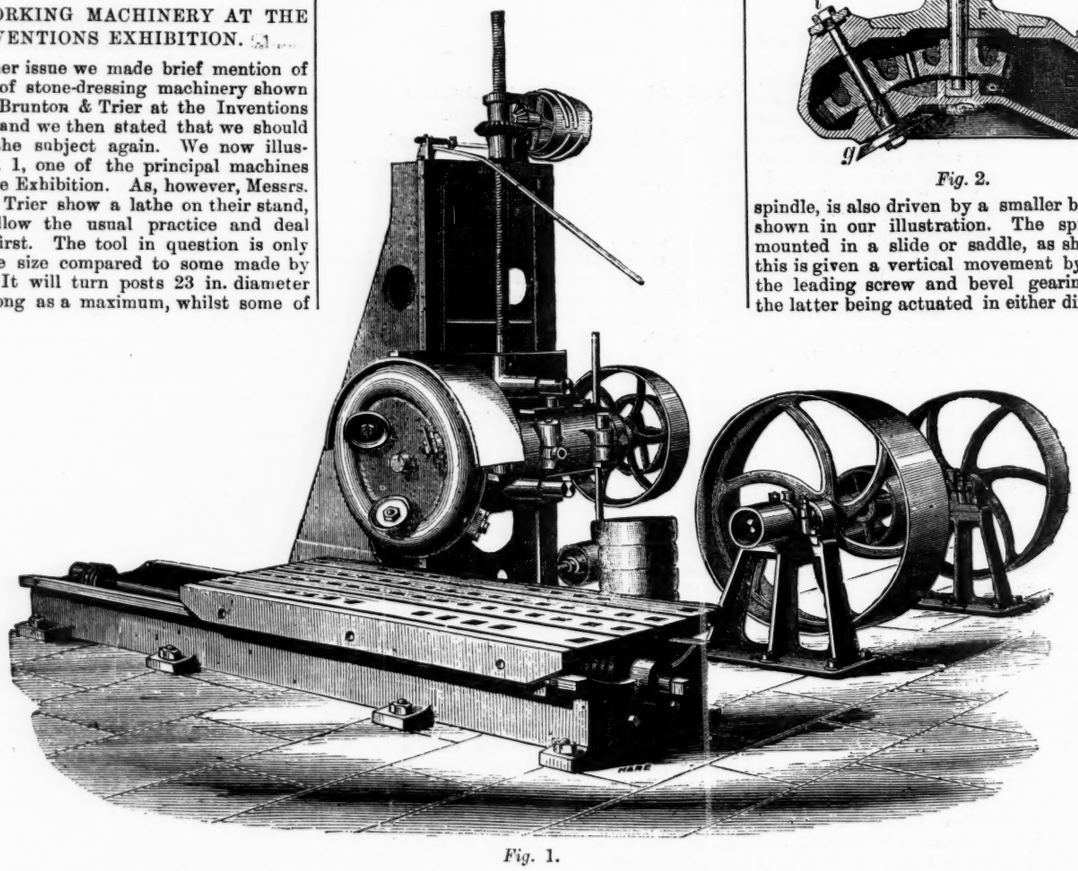


Fig. 1.

Messrs. Brunton & Trier's lathes are used for turning up granite columns 3 ft. 6 in. in diameter and 20 ft. long. The lathe is double-geared, and the work revolves between centres in the ordinary way. The bed is double on each side, so that there is no overhang of the slide-rest. The latter is of the ordinary type of compound rest, excepting that the tool-box forms a bearing for the horizontal spindle, to which the circular rotating cutter is attached. This cutter is in the form of the frustrum of a hollow cone, the cutting edge being the base. The latter is brought in contact with the work as it revolves and in turn is caused to revolve by the rolling contact of the stone. These cutters are made of cast-steel hardened, and the traverse of the tool is automatic. There are two slide-rests, one on each side of the work, the bed being alike on each side for the purpose. This, together with the excellent design and massive nature of the whole tool, allows very small columns to be turned, such, for instance, as those used in Gothic architectural ornamentation. For this purpose granite columns 4 in. in diameter and 6 ft. long have been turned in one of these lathes.

At the Exhibition a granite post was being turned up at the time of our visit. Only a light chip was being taken, but Mr. Brunton tells us that a cut 1 in., and even 1½ in. gives a section of this chuck showing one of the revolving cutters, *g*. Each cutter is mounted on a spindle, *h*, which has on it the toothed wheel *e*, the whole of the wheels on the cutter spindles gearing into the central wheel, *b*. The chuck is carried on a hollow shaft, F, inside which the shaft *k* revolves. Six cutters can be mounted on the chuck, but the whole of them are not always used; in our illustration fig. 1 only three are shown in position. The reason that the cutters have a positive motion imparted to them is because these dressing-machines do not always have the cutters on the work, and were they allowed to run freely they would require a fresh impulse each time they were brought again to their work. This would produce a certain amount of attrition calculated to injure the cutting edge. In the lathe, on the other hand, the cutter is always on the work, so that when once started there is no break in its rotation; in addition to which the lathe-cutters are of light steel, whilst the cutters of the machine in question are chilled cast iron, and therefore considerably heavier. The speed at which the cutters are rotated on their own axes by the geared wheels is so adjusted that it will correspond to the speed that is due to the path or "track" described by the cutters as they revolve in the chuck around the axis of the latter. For in-

belts on fast and loose pulleys. In this way the chuck can be raised or lowered to suit the work. The traversing is done by means of a shaft and gearing beneath the table; the latter running on a suitable frame. The cutter spindles are made of considerable length, with long bearing surfaces. The working pressure is against a back centre-pin of phosphor bronze. An important feature in connexion with this part of the work is the lubrication of the spindle-journals, and their bearings. Grease and oil were found very unsatisfactory, and after much trouble the present arrangement was devised. The gearing-spindle,—*k* in fig. 2,—is bored throughout its length, and an india-rubber pipe is inserted into it beyond the pulley-wheel. In this way soap and water is introduced, which flows through and fills the hollow chuck, so giving lubrication to all wearing surfaces. The soap and water which escapes washes out the grit. This arrangement has been found to work very satisfactorily.

A machine similar to the one shown at the Exhibition was supplied to Messrs. H. & T. Martin, the well-known Belfast contractors, in 1881, having been in constant use up to a recent date, and, so far as we know, is still in operation. We are informed that with this machine 300 to 350 square feet of hard sandstone are faced in a day as a regular thing.

Messrs. Martin speak very highly of the machine, which they say has never given them the slightest trouble in working.

Messrs. Brunton & Trier also show on their stand photographs of other types of side dressing-machines, among them a large size one similar in general design to that just described, which will dress stones up to 2 ft. 6 in. square and 7 ft. long. The chuck has three cutters, and makes 350 revolutions a minute. The speed of travel of the table is 20 in. to 36 in. per minute. This machine requires 5 to 6 h.p. to drive it. Another side cutter has an internal chuck 6 ft. 6 in. in diameter, which makes eighty to ninety revolutions a minute. There are twelve cutters, which may be arranged in four sets of three steps, in three sets of four steps, or in two sets of six steps; the rate of travel of table being arranged accordingly between 10 and 20 inches per minute. This will take work up to 3 ft. 6 in. wide, and, by inclining the bed, stones up to 9 ft. long can be dressed. The chuck neither rises nor falls, but moves in a horizontal direction for bringing it to the work.

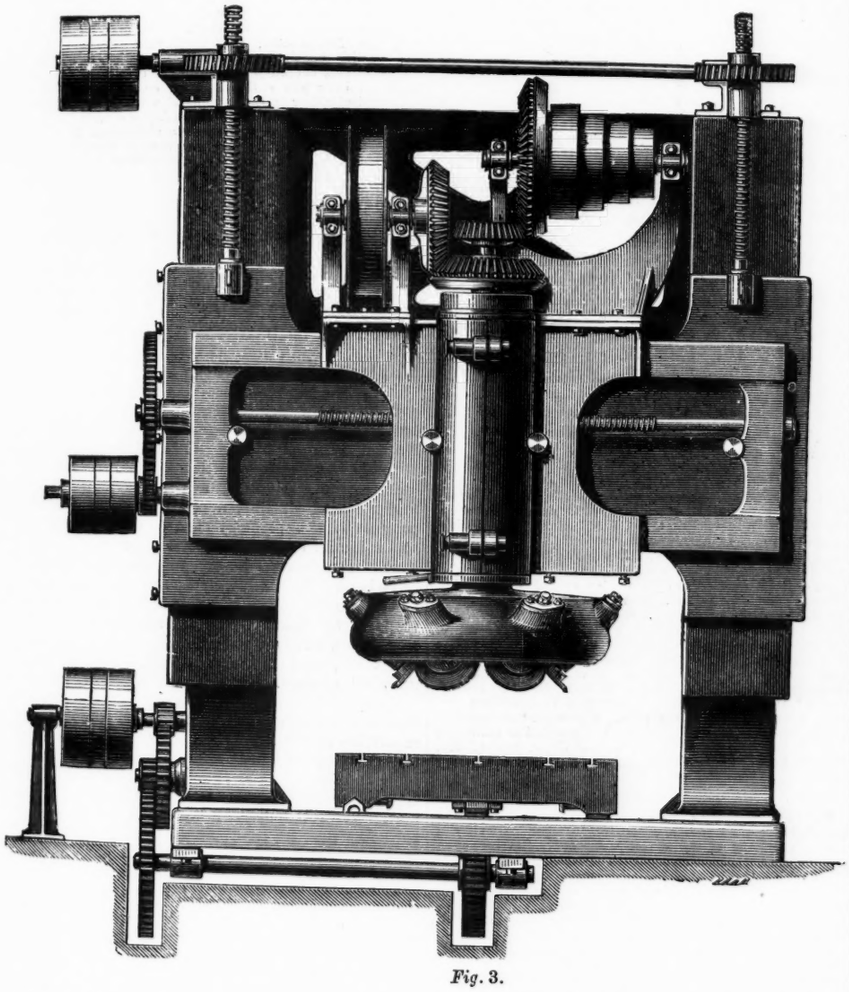


Fig. 3.

One of these machines was supplied to Messrs. Morrison & Mason, of Glasgow, who were the contractors for the Carlisle Station. This firm gives the following details of the performance of the machine on the sandstone used in the work. Stones 4 ft. 6 in. by 2 ft. were dressed at the rate of six stones an hour, which was equal to 54 square feet per hour. Stones varying between 1 ft. 6 in. to 2 ft. high by 3 ft. to 5 ft. 6 in. long, on an average 6 square feet to a stone, were dressed at the rate of fifty per day. The cast-iron cutters were changed once a day, and it was seldom that the work had to pass the machine twice. Messrs. Morrison & Mason state that, owing to want of space they only used one table, and the machine had therefore to be stopped while the work was being changed. They estimate that, with three tables, twice the work could have been done. In fig. 3, above, we give a general view of a top-dressing machine made by this firm. Machines of this type are used for granite and other very hard stones, but with certain modifications they can be adapted for flags, landing, steps, and other work of this description. The chuck makes 300 revolutions a minute. The bed is 13 ft. long, and the table 9 ft. by 3 ft. 6 in., there being side brackets to increase its width up to 5 ft. It will dress breadths of 17 in. at one travel,—of 2 ft. 3 in. in two breadths, or up to 4 ft. or 5 ft. in three or four breadths. The speed of travel of the table is 1 ft. to 2 ft. per minute, according to the work. It will take stones 3 ft. 6 in. high, and requires 8 to 10 horse power to drive it. The trains of gearing by which the various motions are obtained are so clearly shown in the engraving as not to require further description. This tool is not shown in the Exhibition, but we have included it in our notice, as it cannot fail to be of interest to those engaged in work of this description. Smaller machines are made, and there is a special tool which is attached to the cross slide, for monumental work requiring very fine arrises.

We now turn to a different type of machine, an example of which is shown in practical work at the Exhibition. This is a stone angling and moulding machine, which is capable of cutting out internal and external angles. The cutters are of the same type, but are not given a positive motion by gearing, as in the side and top dressers. There are two chucks supported by a suitable standard. These chucks are each composed of four arms in one casting, and they work respectively in a vertical and horizontal plane. The arms of the chucks revolve in intersecting planes, which are, of course, at right angles to each other, but the edges of the cutters describe two circles, the circumferences of which meet at the cutting-point, and in this way the two sides of the angle are formed on the stone. The cutters are made of thin steel, and never require sharpening; all the working parts are enclosed, so as to be protected from grit, and each cutter is adjustable in the direction normal to the plane in which it revolves by means of a sliding bush, in which the cutter spindle is carried. The latter is placed eccentrically in the bush (the bush being free to turn when required in the part that it lines), so that an easy means of adjustment is obtained in the other direction. The chucks are rotated by a suitable arrangement of bevel gearing off one shaft and the table carrying the work traverses automatically. A separate cutter for roughing out is placed at the side and can be used or not as required. We have no details of the speed at which this machine will work, but from the little we saw of its action at the Exhibition there can be no doubt it is a very effective tool. On Messrs. Brunton & Trier's stand is also shown Trier's grindstone dresser. This consists

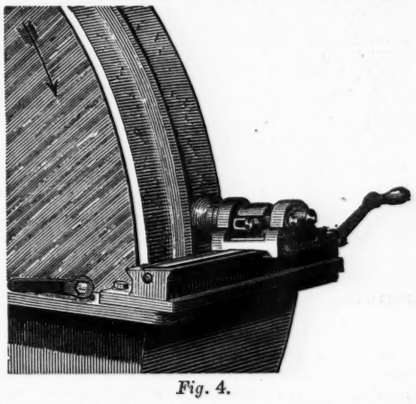


Fig. 4.

of a cutter of the same type as those already described fitted on a slide-rest, by which the stone is simply turned up true. Our illustration, fig. 4, shows this effective apparatus.

THE SEA-DEFENCE WORKS AT HOVE.

THESE works, having now been in progress for five years, are so far completed that the east foreshore, where the encroachments of the sea were greater than at any other point, may be said to be permanently protected. The works at Hove commenced as far back as September, 1880, and have involved an expenditure of upwards of 60,000*l.*, two-thirds of which sum has been expended by the Hove Commissioners, the remainder having been the cost of the works constructed by the West Brighton Estate Company and other owners of property.

Up to January, 1880, the Hove foreshore had for many years gradually received such accretions of shingle naturally, as to form a complete barrier to the action of the sea; but about the time named, the effects of the pier extension at Shoreham Harbour became so apparent, that the Commissioners' engineer, Mr. Ellice-Clark, advised the construction of groynes. These works were pushed on with, but towards the end of 1882 the encroachments had become so serious that it was clear groynes alone would not serve to protect the large expanse of lawns abutting on the sea at Brunswick-terrace. The supply of shingle, which naturally comes from the west, had practically ceased, owing largely to the projection of the Shoreham Harbour west pier, and to the extensive erection of groynes between Bognor and Hove. This being so, and the destruction of the west portion of the lawns being imminent, Mr. Ellice-Clark advised the erection of a sea-wall at the most dangerous place, as a first instalment of this mode of protection, to be ultimately continued along the entire front, about one mile and a quarter. The Commissioners having then expended nearly 10,000*l.* on the works, determined to fortify themselves with a second opinion, and consulted Sir John Coode, with a view to his reporting on the whole question of the sea defences, the result being that this eminent authority advised the immediate erection of the wall along the lawns,—a distance of about 720 yards. Consequently, in 1883, this scheme was let by tender to Messrs. Hill & Co., of Gosport, and in March, 1884, the first concrete block was laid, in the presence of the Municipal Engineers' Association. The extraordinary summer of 1884, coupled with the great energy of the contractors, enabled the work to proceed with such rapidity that previously to the equinoctial gales in October of the same year, the wall, as a sea-defence, was practically completed.

The wall is, for the most part, 24 ft. in height above the foundations, it is 8 ft. 6 in. in width at the base and 3 ft. wide at the top, having counterforts every 12 ft., 6 ft. in length and 4 ft. 6 in. in depth. The outer part of the wall

consists of concrete blocks, faced with large land flints set in neat cement. It may be here stated that, the number of blocks made and fixed *in situ* during the summer of 1884 exceeded 35,000. The entire wall is coped with a bold Cornish granite coping, 2 ft. 6 in. in width, and about 2 ft. average depth. The foreshore is approached by two inclines of 1 in 8, and four flights of steps,—all in Cornish granite. In front of the wall there are five timber and three concrete groynes, each extending from the face a distance of 210 ft. into the sea. Owing to the great impoverishment of the foreshore, the engineers adopted the novel expedient of artificially replacing the shingle removed by the scour of the sea; 20,000 tons of beach have been dropped on to the foreshore from hopper barges. This work has been attended with the best results, the wall having now a considerable bank of shingle in front of it, where, fifteen months ago the denudation had bared it to within 4 ft. of the underside of the foundation. This rapid natural withdrawal of the shingle during the progress of the work caused the engineers considerable uneasiness; but their resources were equal to the difficult position so rapidly set up. For while the artificial deposit of shingle was proceeding at the barest places, sheet-piling was driven in front of the wall, and a large number of faggots was employed. The work proceeded night and day without intermission for three months, so that by the time the heavy winter gales set in the work was completed. Within a very short time of such completion a very heavy S.W. gale on the top of a spring tide put the new work to a most severe test, with the result that though the waves reached a height of 40 ft., when they broke on the face of the wall not a stone was disturbed.

The work projects seawards a distance of 30 yards from the original margin of the lawns. The desire of the engineers to execute such a bold scheme was the subject of much angry controversy at the time, but fortunately the plans were adopted in their entirety with the result that the Hove people have, as a first instalment of the works, a promenade nearly half a mile in length, and thirty yards wide. The great success of the work is borne testimony to by the Brighton public, who frequent the wall in large numbers.

In the course of a few weeks the promenade will be protected by a substantial ornamental fence, which is now being founded by Messrs. Reed & Son, of Brighton. As before stated, the engineers are Sir John Coode and Mr. Ellice-Clark. The contractors were Messrs. W. Hill & Co., of Gosport, to whose energy in completing the works with such rapidity the greatest praise is due.

THE TRADES' UNION CONGRESS.

THE eighteenth annual Congress of Trade Unionists commenced on Monday last at Southport. The chair was taken at the outset by Mr. J. S. Murchie, chairman of the Parliamentary Committee, who, in opening the proceedings, contended that these annual congresses had been latterly far more representative, and possessed the confidence of the trades in a higher degree, than at any other period of their history. He drew attention to the rapid strides "these congresses have made in the public estimation. They have grown," he said, "by sheer perseverance out of the necessity for repeatedly defending our principles against the attacks of a hostile Press and an anti-trade union public into a position of great and increasing power and public influence, which is constantly being exercised for the promotion of the welfare of the masses of the people, and not confined to the trade unionist section alone. Sometimes I entertain doubts on our policy of prohibiting the reading of papers, &c., devoted to the defence of trade unionism, because whenever the public hear of us it is almost always at a time when we may be engaged in some great struggle with employers and when we are naturally our worst side out. The b tter side of our work is too frequently lost sight of. The work we have performed in the direction of making the people thrifty is too little known. Mr. George Howell, in a very excellent article he has contributed to the *Contemporary Review*, shows us that seven trade societies alone paid to their sick and needy members in the year 1876 and the five bitter years immediately succeeding it nearly 2,000,000*l.*, this amount being nearly 200,000*l.* more than their net receipts during the same period. It is a very common superstition that trade societies spend their money on strikes alone, and hence we are frequently lectured by no doubt good-intentioned, but ill-informed, people about the 'error of our ways' in this respect. Now, what is the truth on this subject? I take the same seven societies referred to by Mr. Howell,—viz., the Amalgamated Engineers; Ironfounders; Boilermakers and Iron Shipbuilders; Steam Enginemakers; Ironmoulders of Scotland; Amalgamated Tailors; and Amalgamated Carpenters and Joiners, and I willingly confess that I take them for no other motive than because I find the work partly accomplished by his able pen; and I find that in the nine years ending 1884 their receipts were 2,818,548*l.* 12s. 5d., and their expenditure 2,963,186*l.* 6s. 4d.; of this amount 1,207,180*l.* 11s. 1d. was spent in unemployed benefit; 592,273*l.* 9s. 7d. in sick benefit; in the compensation for loss of tools, superannuation, funerals, accidents, benevolent grants, and other minor benefits, including cost of management, 975,052*l.* 2s. 7d.; and the remainder, 188,680*l.* 3s. 1d., or about 6½ per cent., was the only amount expended in connexion with trade movements. These figures satisfactorily demonstrate that, although we have exercised considerable influence over the conditions under which we have to labour, we have not exercised it in the wild and reckless manner for which we have been so often and so mistakenly condemned."

On the motion of Mr. Richards (Southport), seconded by Mr. Drummond (Glasgow), Mr. T. R. Threlfall (Southport) was unanimously elected President of the Congress. Mr. John Young (Southport) was appointed Secretary to the Congress, Mr. Laird (Newcastle) Vice-President, and Mr. Burnett (London) Treasurer.

The President having taken his seat, intimated that, in accordance with custom, he would reserve his address until Tuesday morning.

Mr. Broadhurst, M.P., Secretary to the Parliamentary Committee, read the report of that body, which dealt with a number of subjects. We make a few extracts:—

Increase of Factory and Workshop Inspection.

In Committee of Supply, on June 4th, your secretary called the attention of the House of Commons to the desirability of an increase in the staff of factory and workshop inspectors, and in his remarks the views of the Congress were fully set forth. The speech was followed by a useful and interesting debate, in which Mr. Burt took an able part, and in which the opinions expressed were all but unanimous in our favour. The Under Secretary of State for the Home Department, Mr. H. H. Fowler, in replying for the Government, said that they were fully in favour of the principles advocated, and it was only a question of degree as to its application. He showed that a steady increase had been going on. In 1868 there were 38 inspectors, in 1872 there were 49, and in 1885 there were 56, and a further increase was being carefully considered by the Home Secretary, Sir William Harcourt. Altogether, the debate was most successful. We are glad to announce that during the year Mr. J. T. Birtwistle, son of Mr. Thomas Birtwistle, has been added to the staff of factory and workshop inspectors.

Workmen Magistrates.

The Parliamentary Committee have frequently received complaints from societies concerning alleged partiality of magistrates, and of the police partly controlled by them, in cases of trade disputes. The Committee was of opinion that the most practical way of dealing with those complaints was to seek to get raised to the bench representatives of labour; and in the early part of the year your secretary sent to the Chancellor of the Duchy of Lancaster a statement on this subject. After considerable correspondonce, and several personal interviews, Mr. Trevelyan, the then Chancellor, announced his intention of adopting the suggestion, and, in a short time, four of our friends were raised to the bench, viz., Mr. Slatter, Manchester; Mr. Birtwistle, Accrington; Mr. Fielding, Bolton; and Mr. W. Pickard, Wigan. This movement must not be permitted to rest here; we must have men on most of the magisterial benches of the United Kingdom. The appointment of magistrates is too much a matter of political influence and of social intrigue; but in all cases where recommendations for such posts are made by elective bodies, the well-directed pressure of the working classes may ensure that the name of some suitable workman shall be included. The departure thus made cannot be over-estimated in its importance.

Employers' Liability Act Amendment Bill.

The Employers' Liability Act Amendment Bill was fixed for second reading on Wednesday, April 29th, but, like the other Bills of private members, it was crowded out by pressure of Government work, and a similar fate awaited attempts in other directions and other subjects of last year's programme. Although our special questions may not be advanced so rapidly as we could have wished, still our cause in its broadest sense has progressed by leaps and bounds. We have gained two millions of votes, a more equitable division of electoral power, the extension of the hours of polling from four o'clock till eight o'clock at night,—objects for which we have been contending will be the more easily attained with our enormously-increased political power. The work of the next Parliament will be mainly decided at the ballot-boxes in November. It is, therefore, to the ballot-box that we advise our friends to direct their attention for the next month or so. Other interests, vast in extent, powerful in their influence, unremitting in their efforts, will crowd and jostle in the same place and at the same time. It rests with us to press ours to the front.

Co-operation.

In accordance with the resolution of the Nottingham Congress, your commitree appointed four of their number, Messrs. Murchie, Bailey, Sedgwick, and Slatter, as their representatives on the Joint Committee of Trade Unionists and Co-operators for the purpose of promoting co-operative production on just and sound principles, and of endeavouring to adjust disputes that might arise between co-operative societies and their workpeople. Only in one case, and that quite recently, has the committee had brought under its notice any difficulty between co-operative societies and their workpeople. No formal action was taken by the committee, but they have reason to believe that a communication sent in their name had some influence in securing a settlement of the differences which had arisen between the manager of a large wholesale co-operative establishment and the members of a trade union in their employ.

The Royal Commission on Trade.

A royal commission has been appointed to inquire into the cause of the depression in trade. Out of upwards of twenty members of which it is composed, representing the interest of capital and labour, there was only one labour representative until your secretary had, by letters to the Government and questions in the House of Commons, raised a protest against the one-sided composition of the commission, when Mr. Drummond was added to Mr. Birtwistle, after your secretary had refused to join it on the ground that the labour interest had been grossly neglected. Your secretary's contention was that the investigations would in all probability lead to an inquiry into the wages and hours of labour, as well as into the policy of restrictive laws, such as the Factory and Workshops Act, the Mines Act, the Employers' Liability Act, and similar legislation affording protection to life and limb. If this should prove to be the case, then, he contended, labour was entitled to an equal representation with capital either in the persons of working men or men in whom the labour interest had the fullest confidence. We are quite ready to acknowledge the ability and fitness of our worthy friends and colleagues, Messrs. Birtwistle and Drummond, but two cannot contend in arguments and votes against twenty others, some of whom are men of great weight and ability.

On the motion of Mr. Shipton (London), the Congress adjourned until Tuesday morning, when

The President delivered his address, in the course of which he said,—It seems to me the establishment of the nine-hours system was one of the great landmarks in the progress of the labouring population. Education loses half its force and benefit when given to overworked and underfed people, and there is abundant evidence that the educational progress of the last few years has been materially assisted by the reduced working-day. At the present moment there is a stronger moral activity amongst the masses, a greater restlessness under social wrongs, a more searching desire to get to the primary causes of our troubles, and a louder cry for domestic reforms, than has ever been heard before. While the people have been educated, they have had more time to think and read. What is our duty now in respect to the present depression in trade? People are tired of prophesying and hoping for a revival, and a dull resignation is settling upon all classes. It has, as we know, lasted fully eight years, and the universal cause ascribed is over-production. Protectionist countries as well as Free Trade England are alike suffering from it, and the time has come to go deeper into the cause than skimming the surface by competing with other nations in restrictive tariffs. As a first step, I believe the time has arrived for the trades of the kingdom to take action in securing the eight hours' working day. Beneficent as its operations would be to the individual, it would cause employment to be given to thousands of our starving brethren and sisters whose distress wrings our hearts. It must not, however, be thought that this will be a permanent solution of the difficulty. It will relieve the country for a few years. We have a rapidly-increasing population, a glutted market, and little hope of any great expansion of our foreign trade. Foreigners have a perfect right to manufacture their own goods, and we must in future expect greater competition in this respect. Indeed, if our manufacturers continue to supply the semi-civilised races with sized cotton, shoddy, and spurious imitations, they deserve to lose this trade as well. Instead of wandering over the earth, panting for fresh markets, or debating as to being quits with the foreigner by taxing food, I think practical steps should be taken to reorganise our home market. Vast as our population is, there is plenty of room for millions more if the land were properly cultivated. You will discuss this subject at length, but let me say that trade may well be depressed when 1,000,000 acres of land have gone out of wheat cultivation in ten years, and the agricultural population has decreased about 15 per cent. Our over-crowded towns and repleted labour market show where these displaced workers have gone. I have no sympathy with State-

aided emigration, or emigration at all, while vast tracts of our native country are lying waste, waiting for labour to make them teem with plenty . . . . . From first to last Parliament has always taken the standpoint of the capitalist in all industrial questions. It has been the boast of trade unionists that they belong to no political party; I hope they never will as it is now understood. It will be an evil day when English trade unionism is dragged at the heels of modern partisanship. We have everything to gain for the people by standing aloof from office-seekers and place-hunters; and our duty is to organise the masses, and thereby obtain reforms which shall make the conditions of living better than they are now. We should now be selecting the planks to form a platform whereon workmen of all sections, beliefs, and creeds may unite. . . . . It seems to me the most critical period in the history of English trade unions is at this moment. They must either lead or follow: they cannot halt between two opinions. They must form the nucleus of the Labour party of the future, or sink into comparative insignificance. Let me remind you that the destiny of the empire is now in the hands of labour, and, whether we will or no, the masses will refuse to go on the old lines.

At the close of the President's address, a vote of thanks was accorded to him for delivering it, the proposition being moved by Mr. Blower (Burslem), seconded by Mr. Jack (Glasgow), and supported by Mr. Knight (Newcastle).

The Congress then proceeded to discuss the Report of the Parliamentary Committee, and after the Standing Orders Committee had reported that they had examined the credentials of the delegates, and found that there were 161 delegates present, representing 136 trade societies or trade councils, with a muster roll of 560,976 members, the Congress adjourned until Wednesday morning, when

The consideration of the Parliamentary Committee's report was resumed. With regard to the Employers' Liability Act, the following motion was proposed by Mr. J. Burnett, seconded by Mr. Hunter (Glasgow), and adopted unanimously:—

"That, having regard to the unsatisfactory condition of the Employers' Liability Act, by reason of the power left to employers to compel workmen to contract themselves out of its provisions, and also on account of the Act failing to afford compensation for or security against accidents from the defective fencing of special machines as distinguished from general machinery or mill gearing, it is resolved that the Parliamentary Committee be instructed to use its utmost efforts to secure the amendment of these defects in the Act by the new Parliament; also that workmen generally be called upon to obtain pledges of support on this subject from Parliamentary candidates."

On the subject of certificates for enginemen, on the motion of Mr. J. Swift (Manchester), seconded by Mr. W. H. Lambton (Durham), the following resolution was approved by the Congress:—

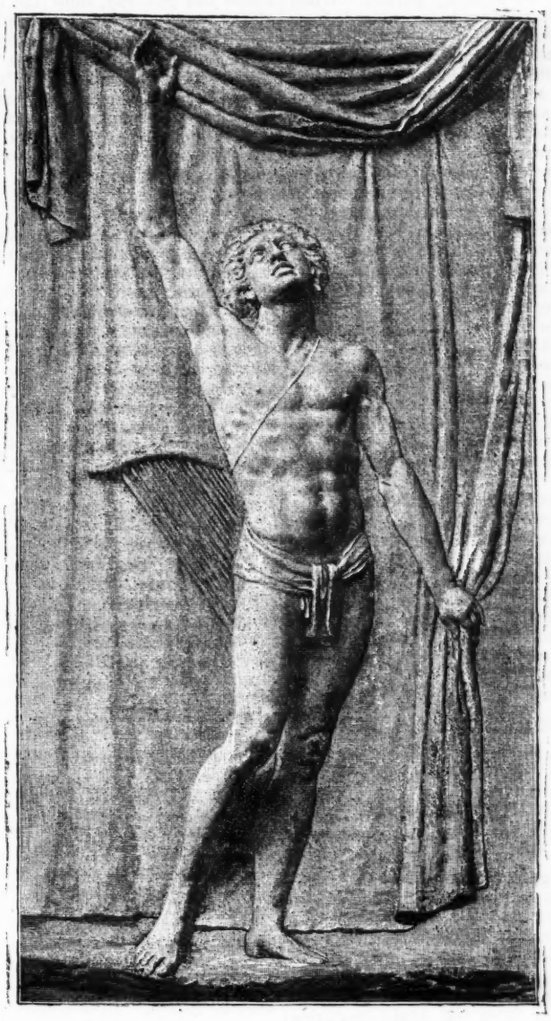
"That, in the opinion of this Congress, it is necessary, for the prevention of the sacrifice of life and injury to the person which not unfrequently take place through the unskilful management of steam engines and boilers on land, that judicious legislation should be enforced, making it imperative that all men in charge of such engines and boilers must possess a duly qualified certificate, the same as is provided in the case of men in charge of steam engines at sea; and the Parliamentary Committee are hereby instructed to use every means in their power to have effect given to such legislation."

With reference to factory and workshop inspection, Mr. Holmes (Burnley) proposed, and Mr. Drummond (Glasgow) seconded, the following resolution:—

"This Congress, while fully recognising the importance of the appointments made by the late Government of practical working men as factory and workshop inspectors, instruct the Parliamentary Committee to again draw the attention of Government to the inability of the present staff to maintain anything like a due observance of the Act, and urge upon them in the strongest possible manner the necessity for the appointment on the staff of a considerable additional number of practical working men, and, where expedient, women."

Considerable discussion followed the resolution, the scope of which was that there was a great need for the extension of the staff of inspectors. An expression of opinion was given that inspection should be applied to workshops where it at present did not exist, and that shops, such as those of bakers, which were underground, should receive extra attention. Mr. Trotter (Durham) suggested an amendment to the effect that the motion should be altered so as to include the appointment of inspectors to supervise workshops in connexion with mines, which at present are inspected neither by factory nor mine inspectors. Mr. Bailey (Preston) objected to the second point being discussed as an amendment, and on being put to the vote it was rejected by 72 votes to 19, and the resolution was adopted.

In the evening, the delegates and their friends dined together in the Cambridge Hall.



"David entering Saul's tent."

SCULPTURE: "DAVID ENTERING SAUL'S TENT."

THIS bas-relief was one of the sculpture exhibits in this year's Royal Academy which we wished to illustrate, but of which the artist, Mr. Mark Roche, was unable to give us a photograph till after the close of the exhibition. The work is a decorative panel in relief, the subject being suggested by the lines in Browning's well-known poem, "Saul," where David is represented as pausing outside the tent:—

"Then once more I pray'd,
And open'd the fold skirts and enter'd, and was not afraid."

The work struck us as one of those which evinced original thought and feeling, and we are indebted to the artist for giving us the opportunity of reproducing it.

THE MASTER MASON WHO BUILT ST. PAUL'S CATHEDRAL: EDWARD STRONG.

IN the Parish Church of St. Peter, at St. Albans, is to be seen the monument to this man's memory; when we look at St. Paul's and see his excellent workmanship, and consider the mechanical means at his disposal, his name, without doubt, is worthy of being more generally known to the present generation. This handsome monument is formed of grey and white marble, with a bust at the top, and the following inscription, viz.:—

"Near this Place are Deposited
the Remains of
Edward Strong,
Citizen and Mason of London
Whose masterly abilities and Skill in his Profession
The many Public Structures he was employed in Raising
Will most justly manifest to late Posterity.
In erecting the Edifice of St. Paul,
Several years of his Life were Spent,
Even from its Foundation to His Laying the Last Stone
And herein (equally with its ingenious Architect
Sr. Christopher Wren
And its truly pious Diocesan Bishop Compton)
He shared the Felicity
Of seeing the Beginning & Finishing
Of that Stupendous Fabrick.
In Piety to his God
In Justice, Fidelity, Kindness & Charity to his Neighbour,
In Temperance, Humility, Contempt of the World,
And the due Government of all his Appetites & Passions,
In Conjugal & Paternal Affection,
In every Relation, every Action, & Scene of Life,
He was what the Best Man, the Best Christian,
Would desire to be at the Hour of Death;
He died 8th of February MDCCXXIII. In the 72nd year of his Age."

W. S. HORNER.

THE HARDENING OF PLASTER.

M. JULHE recently brought before the notice of the French Academy of Sciences a number of experiments made by him regarding the more extensive use of plaster by such means as substituting it for wood in the construction of flooring. His idea is based upon the augmentation of volume which takes place in plaster after its application, while other mortars or cements (as well as wood) are liable to shrinking or cracking as consequences of desiccation. When applied in layers of sufficient thickness to resist breaking, it is unaffected by time and atmospheric changes, provided it is not exposed to water.

Two properties are, however, still needed before plaster could be used in the general manner indicated, hardness and resistance to pressure from above, and these M. Julhe considers he has found a method of supplying. He thoroughly mixes six parts of superior plaster with one part of fat lime, recently slaked and

finely sifted. This composition is applied in the same manner as ordinary plaster. When dried, the object produced is steeped in a solution of any sulphate with a base capable of being precipitated by lime and an insoluble precipitate. Sulphate of iron and sulphate of zinc are the most suitable agents. The lime in the pores of the plaster decomposes the sulphate, and two insoluble substances are produced; sulphate of lime and oxide which fill the pores of the object treated. With sulphate of zinc, the plaster remains white, and with sulphate of iron it passes through a greenish stage by the action of time and desiccation into the tint which characterises sesquioxide of iron. By using sulphate of iron greater hardness of surface is produced, and the resistance is twenty times that of ordinary plaster.

The proportions of lime and plaster are not exactly fixed, but may be varied in accordance with the results sought to be obtained. Still, the proportion of 1 to 6 has been found by M. Julhe to give the most satisfactory results. It is also recommended not to pass and repass the trowel for too long a time, the quickest workman being the most suitable for this operation.

By using sulphate of iron an aspect of rust is obtained, but if there is passed over the surface some lithargised linseed oil (a little browned by heating) a mahogany tint is produced, while a certain superficial elasticity is likewise gained. The shade is improved by the use of a layer of hard copal varnish. A layer of plaster, 2¼ in. to 2¾ in. in thickness, treated in the manner indicated, will make a perfectly smooth flooring, quite applicable as a substitute for oak, and at a quarter the price.

Illustrations.

BUILDINGS IN TOLEDO:

THE "PUERTA DEL SOL" AND THE HOSPITAL OF SANTA CRUZ.

AMONG the great historical but still existing cities of the world, it would be difficult to find one which has more completely preserved its ancient features than Toledo. Rome may date further back, but its actual appearance is modern compared with Toledo. For one reason among others, because it was reconquered from the Arabs centuries before the rest, Toledo possesses special features of its own, not to be found in the same degree, or not at all, in any one of these. Cordova, in respect to its narrow, tortuous streets and Roman remains, is the city that comes nearest to Toledo. Cordova, indeed, owns a monument unique in its kind, that marvellous mosque, like nothing else we have ever seen; but, exception made of the mosque, Cordova cannot compete in variety of artistic monuments of every age with Toledo.

In the course of these notes it is quite out of the question to do justice to an ancient city of such striking architectural merits; and hence we shall have to confine our remarks to the chief points brought into view in our illustrations.

The finest views of the city are obtained from across the Tagus. Thence the peculiar strength of the position can be understood at a glance. The Tagus curves round in the shape of an extended arc, and is lost to view at either extremity amidst its embosoming rocks. No bridge is visible, neither Alcantara, lying eastwards, nor San Martin westwards.

Sloping upwards from the summit of the cliff, overhanging the river towards its culminating point, lies the picturesque city; the imposing Alcázar crowning the *arx* or summit to the right, the cathedral in the middle, another noble group not far beyond, and the walls of a ruined palace lower down. As to the rest, the city is one of irregular lines and flat roofs, of a type quite as Oriental as it is Southern.

LA PUERTA DEL SOL, or "Gate of the Sun," of which we give an illustration, is one of the most characteristic and best known in Toledo. It is situated on the north side of the city, in the immediate vicinity of the buildings last described. It is so disposed that about sunrise the luminary appears through it from the outside rising over the city. The gateway is formed by a series of five arches of different shape, the two innermost guarding the portcullis. The style of the gateway is Moorish in process of development, though not so far advanced as in the Alhambra. The two brick arcades in panel above the gateway, show the double influence of the round and pointed arch, thus exhibiting a sort of transition phase in the Moorish style, similar to the Transition from Romanesque to Gothic farther north. The Puerta del Sol is placed between two lofty towers, one of which is square and seems to form part of the defending wall of the city, and the outer is round, adorned with a row of windows and projecting turrets in the higher stage. The lower and higher parts of this round tower seem to belong to different periods. The medallion over the round arch contains a triangle, in which appear the sun and moon upon a band across the middle. This medallion shows the arms of the Cathedral of Toledo, in which the Blessed Virgin appears to San Ildefonso and bestows a vestment upon him in consideration of a work he had written in her honour. In the middle of the lower arcading above the outer arch are some small figures, scarcely distinguishable through the effects of time, which connect the structure with San Fernando, the conqueror of Seville from the Moors, and who died A.D. 1252. These worn-away figures are believed to represent "Las Justicias del Rey Santo" upon the Alguacil Mayor or High Constable, Fernan Gonzalez, for outrages upon two "Toledanas."

The author of "Las Bellezas de Españas," Sr. Quadrado, is of opinion that these remains, connecting the structure with the Christian monarchs who reigned in Toledo and made it their capital from the end of the eleventh to the middle of the sixteenth century, were later insertions into the original Moorish gateway, dating, in his opinion, from the eleventh century and previously to the Christian reconquest in 1085.

The figures referring to San Fernando are in the central of the intersecting round arches. In the higher stage are pointed intersecting arches, the intersected arcs being cinquefoiled below and trefoiled above. This gate and the older one above (see in the illustration) are just outside the wall of Wamba the Goth, though inside that of Alonzo VI. of Castile and Leon.

THE DOORWAY OF THE HOSPITAL STA. CRUZ.

We give this doorway, with its accompaniments, as a fine specimen of sixteenth-century work in Toledo. They appear to be insertions in older walls. The sculpture exhibits expression and force. The ornament is, indeed, overloaded, but it shows great delicacy of execution. The peculiar combination of Arabesque ornamentation and Greco-Roman forms, with a reminiscence of Mediæval detail, which elements went to make up certain phases of the Renaissance in Spain, can be studied in this gateway, as well as in the two fine *patios*, or courts, and richly-wrought staircase of the hospital. The especial phase of Renaissance here illustrated is that known to architectural historians as "Plateresque."

HIGHER GRADE SCHOOLS, CARDIFF.

WE give this week an illustration of the Higher Grade Schools built by the Cardiff School Board, which were opened in February last, this being the first one built by the Board for higher grade instruction. It occupies an excellent open site in Howard-gardens, in the Roath suburb, the best part of the town. In general arrangement, it is greatly similar to an ordinary fair-sized elementary school, except that a laboratory, fitted up for chemistry teaching, is provided in the rear of the boys' department. It is designed to accommodate 800 scholars,—350 girls and 450 boys.

On the ground-floor, which is the boys' department, there is a large schoolroom and four classrooms, all in direct communication. There is also a master's room, with water-closet and lavatory accommodation attached, together with room for hats, &c., and lavatories for the scholars. The laboratory is entered by a covered corridor from the main building, and covered spaces extend therefrom along the playgrounds.

On the first floor, which is approached by a staircase of concrete blocks, is the girls' department. This floor contains a large schoolroom, with three class-rooms in direct communication; also private room for mistress, room for hats and cloaks, and lavatory, &c. There is a separate stone staircase giving exit from this floor down to the playground and covered playsheds at the end, near which are the conveniences for the scholars. The floors are of fireproof construction, formed of concrete between webbing and girders, the soffits of the latter being visible and painted to relieve the ceilings of the ground-floor rooms.

All the rooms are constructed to allow of cross-ventilation. The heating throughout is by means of hot-water pipes or coils. Trunks are provided for the extraction of vitiated air; fresh air is admitted by means of wall flues, the mouths of which can be opened or closed at pleasure. The building is faced with local buff bricks, with bands of red brick and dressings of Bath and Grey Portland stone, the roofs are covered with green slates, finished with terra cotta crests and terminals, &c. The fittings throughout were designed by the architects.

Messrs. James Seward & Thomas, of Cardiff and Swansea, were the architects, the builder being Mr. Clerke Burton, of Cardiff.

BALTIC CHAMBERS, SUNDERLAND.

THIS block of property, which has been erected at the corner of John-street and St. Thomas-street, contains on the basement a restaurant and grill-room, with smoke and reading rooms attached. The floors are tiled, and there are tiled dados in the rooms and to the staircase.

On the ground-floor, facing into St. Thomas-street, are five shops and two offices facing into John-street.

The first and second floors are occupied by suites of offices, which are approached by a stone staircase and corridors (which will have tiled dados), from the entrance in John-street.

On the third floor are the caretakers' rooms, together with conveniences, &c.

The fronts are of polished freestone from Prudham Quarry, and there are polished granite pilasters between the shops on the ground-floor. The main entrance for the offices is in John-street, that for the restaurant being in St. Thomas-street. The building has been erected under the superintendence of the architects, Messrs. J. & T. Tillman, at a cost of 8,000*l*. The contractors were Messrs. E. B. Reed & Sons, of Newcastle-on-Tyne; Mr. W. H. Surtees, Sunderland, undertaking the iron and plumbers' work; and Messrs. Rule Bros., Sunderland, the plaster work.

ST. MARY'S COLLEGE, WOOLHAMPTON.

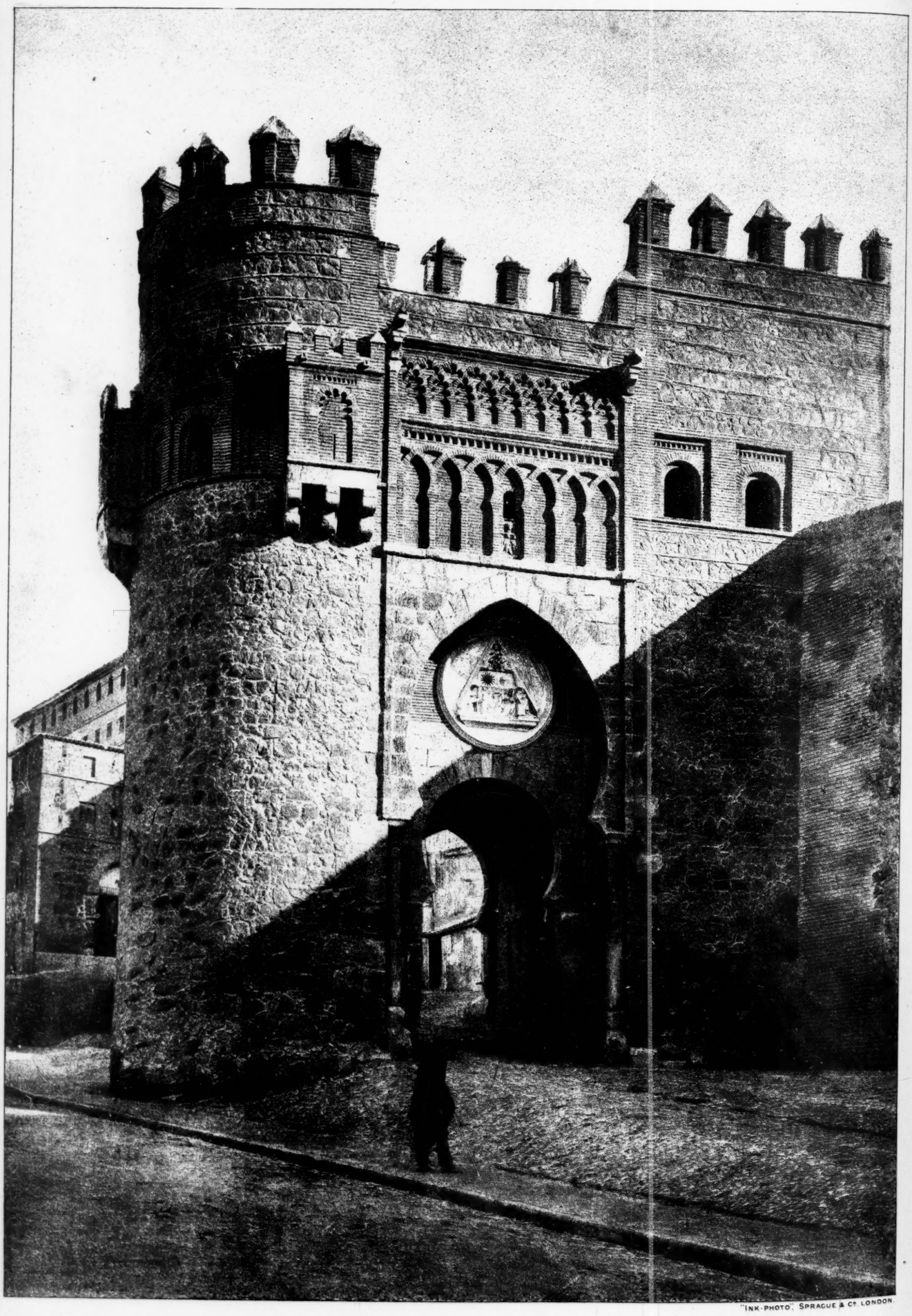
THIS college, which is situated a short distance from Newbury, in Berkshire, has existed as a Catholic educational establishment for many years. The buildings, however, with the exception of the church, erected in 1848, were of a very unsubstantial nature, and had become much dilapidated. Last year, therefore, it was finally determined by the Bishop of Portsmouth to reconstruct the college (excepting the church) on a larger scale, providing accommodation for church as well as lay students.

The new buildings are of Late Perpendicular or Tudor character, and are carried out in red brick, with Ham Hill stone dressings, and tile roofs. Internally the staircases are of stone, and the ground floors, where not tiled or paved, are laid with wood block pavements. The whole of the internal fittings and woodwork are in strict accordance with the style of the buildings.

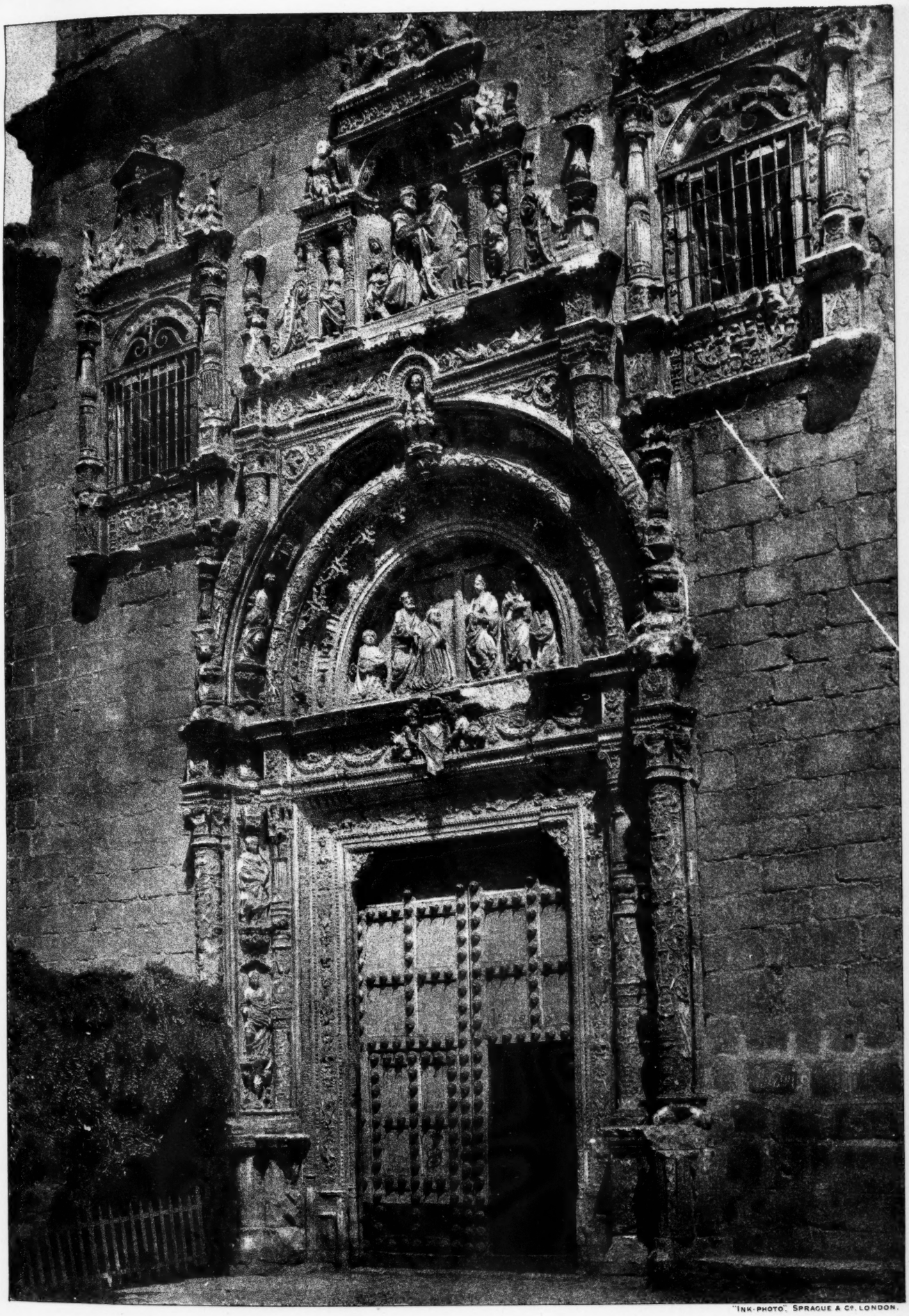
Mr. Fredk. A. Walters, of 4, Great Queen-street, Westminster, is the architect; and Messrs. Buckle & Wheeler, of Abingdon, are the contractors.

REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION EXCURSION.

A DESCRIPTION of Canons Ashby Church will be found in the report of the annual excursion of the Architectural Association in our number for August 15th; while some account of Broughton Castle and the churches at Alkerton, Hanwell, and Bloxham will be found in the number for August 22nd. The three-storied porch at Bloxham is especially interesting. The ground-floor story is groined, and forms the south porch to the church; the first floor was probably the priest's room, as there is a fireplace in it, and the second floor may have been used as his sleeping apartment. A careful measured drawing of it has been published in the current volume of the "Architectural Association Sketch-book."



THE "PUERTA DEL SOL," TOLEDO.



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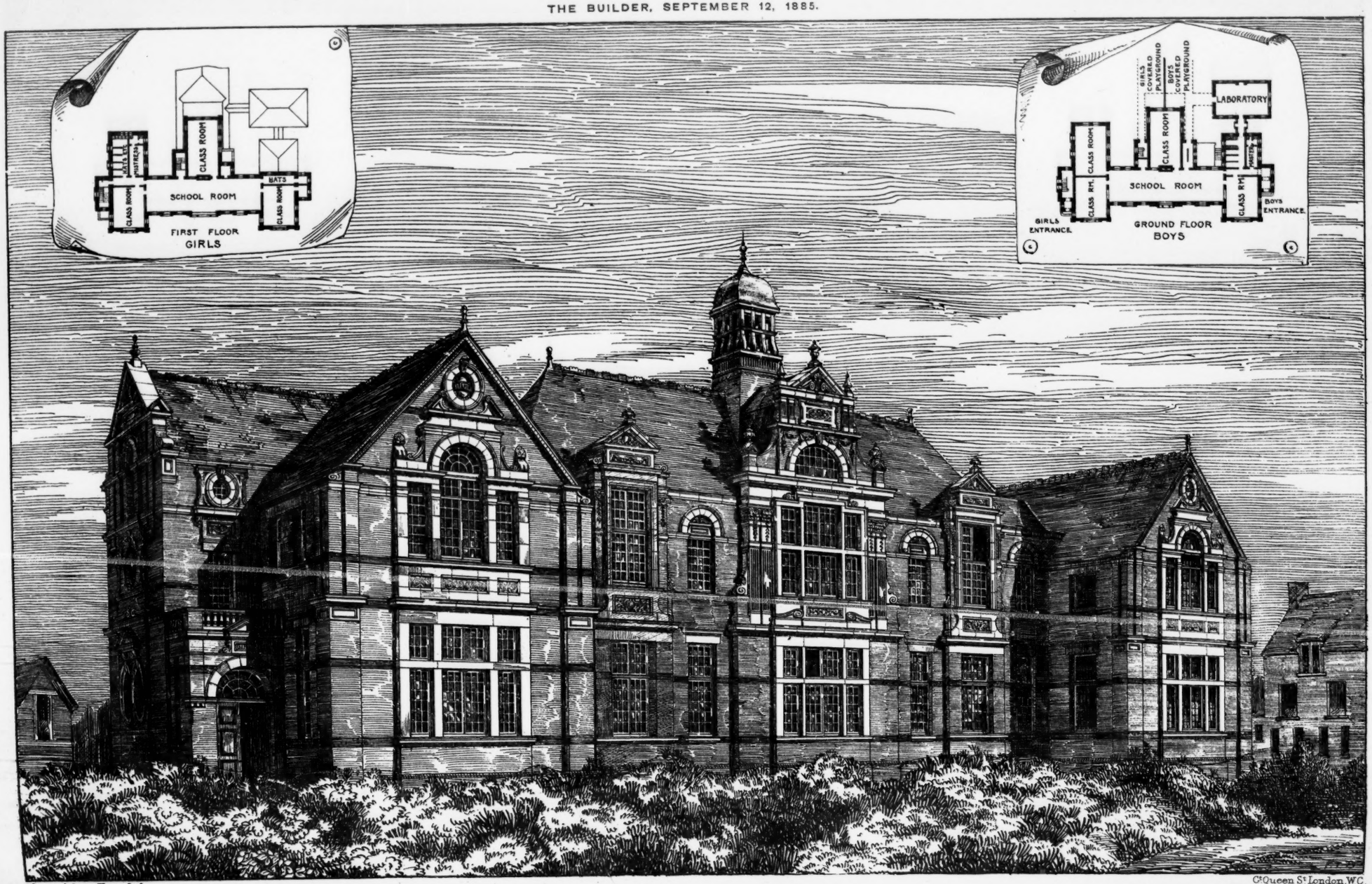
PORTAL OF THE HOSPITAL OF SANTA CRUZ, TOLEDO



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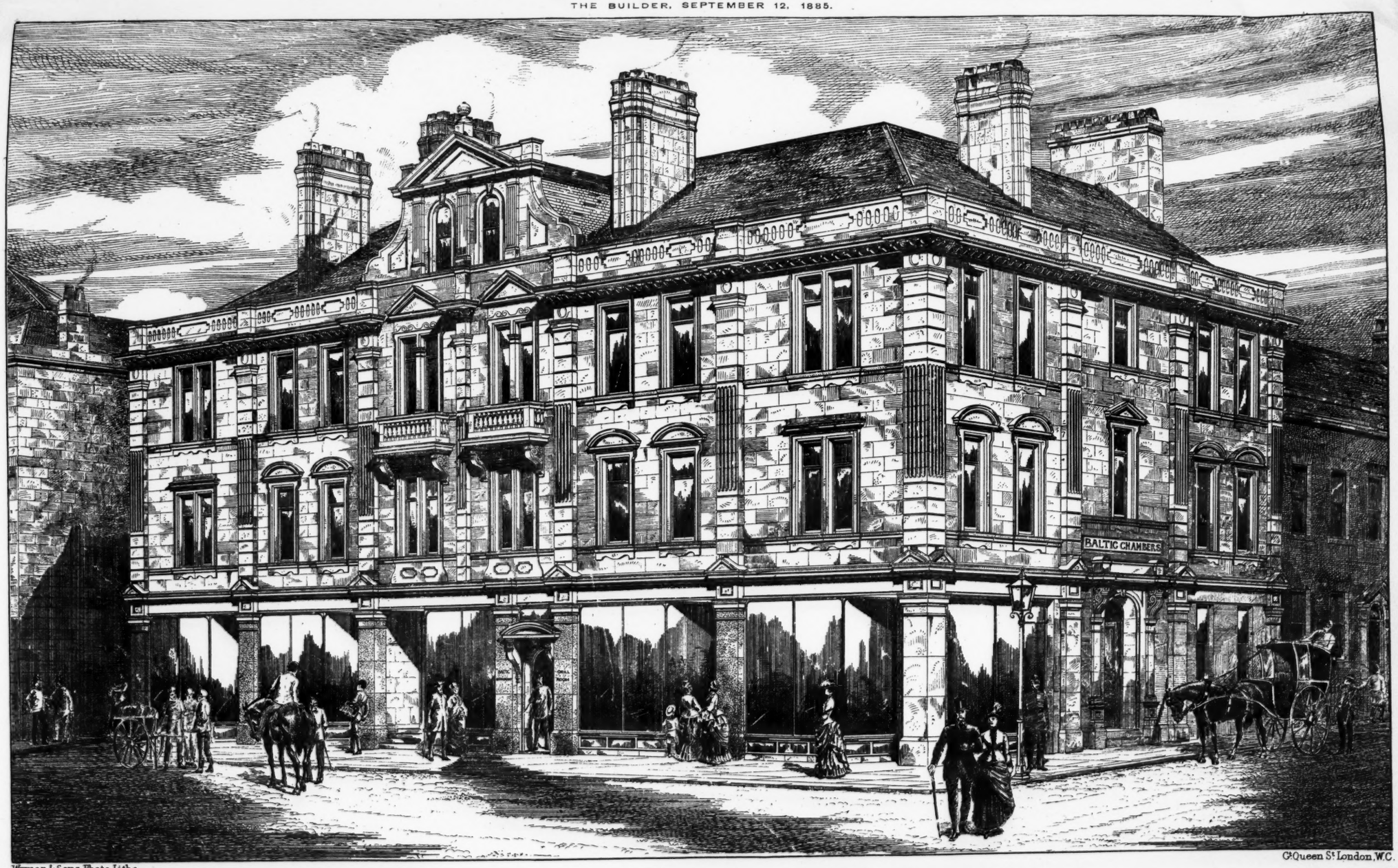
HIGHER GRADE SCHOOLS, CARDIFF.—Messrs. James Seward & Thomas, Architects.

THE BUILDER, SEPTEMBER 12, 1885.



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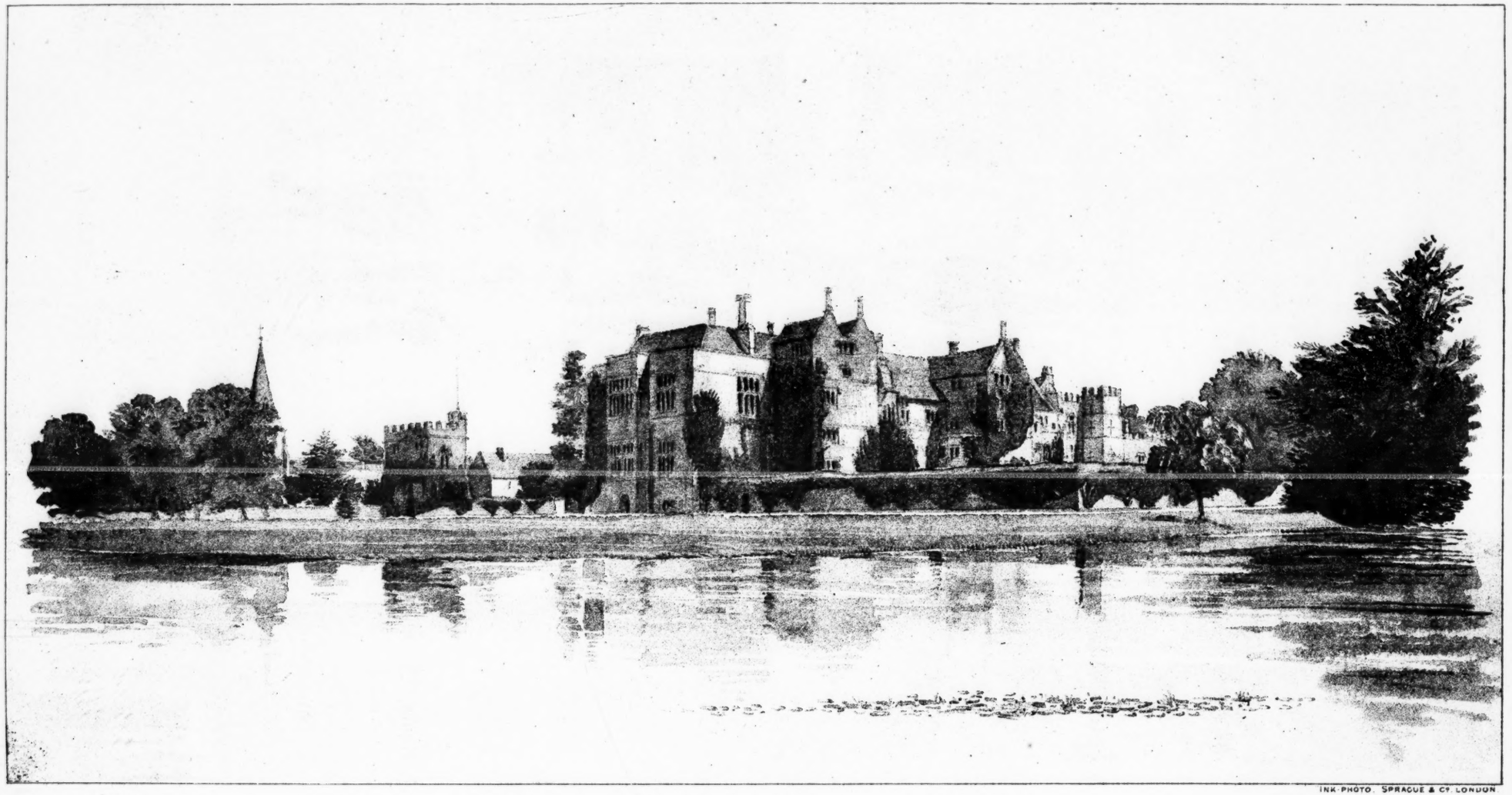
BALTIC CHAMBERS, SUNDERLAND.—Messrs. J. & T. Tillman, Architects.



INK-PHOTO. SPRAGUE & Cº. LONDON

REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION EXCURSION, 1885.

BROUGHTON CASTLE, FROM A WATER-COLOR SKETCH BY MR. J. JOHNSON.

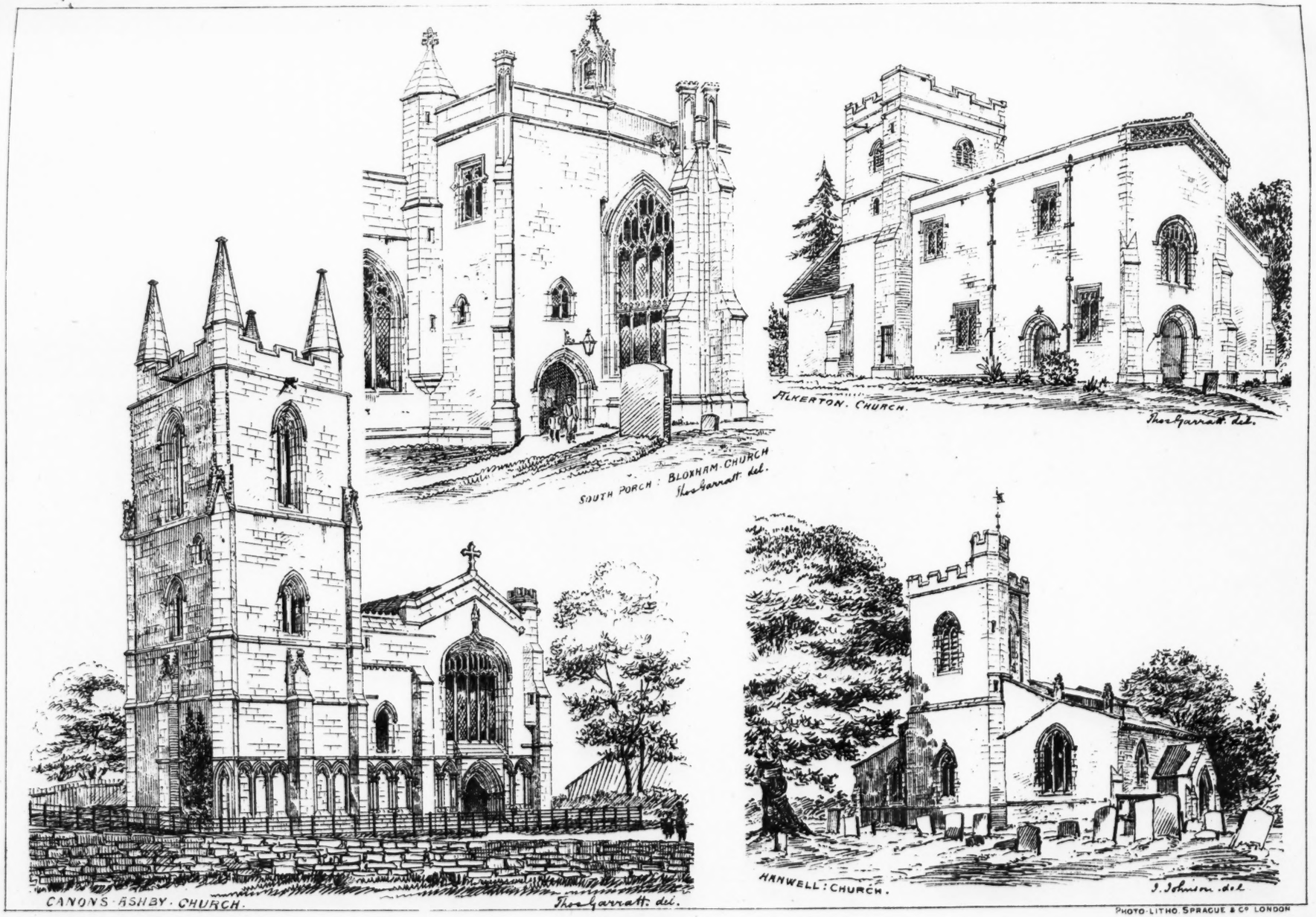
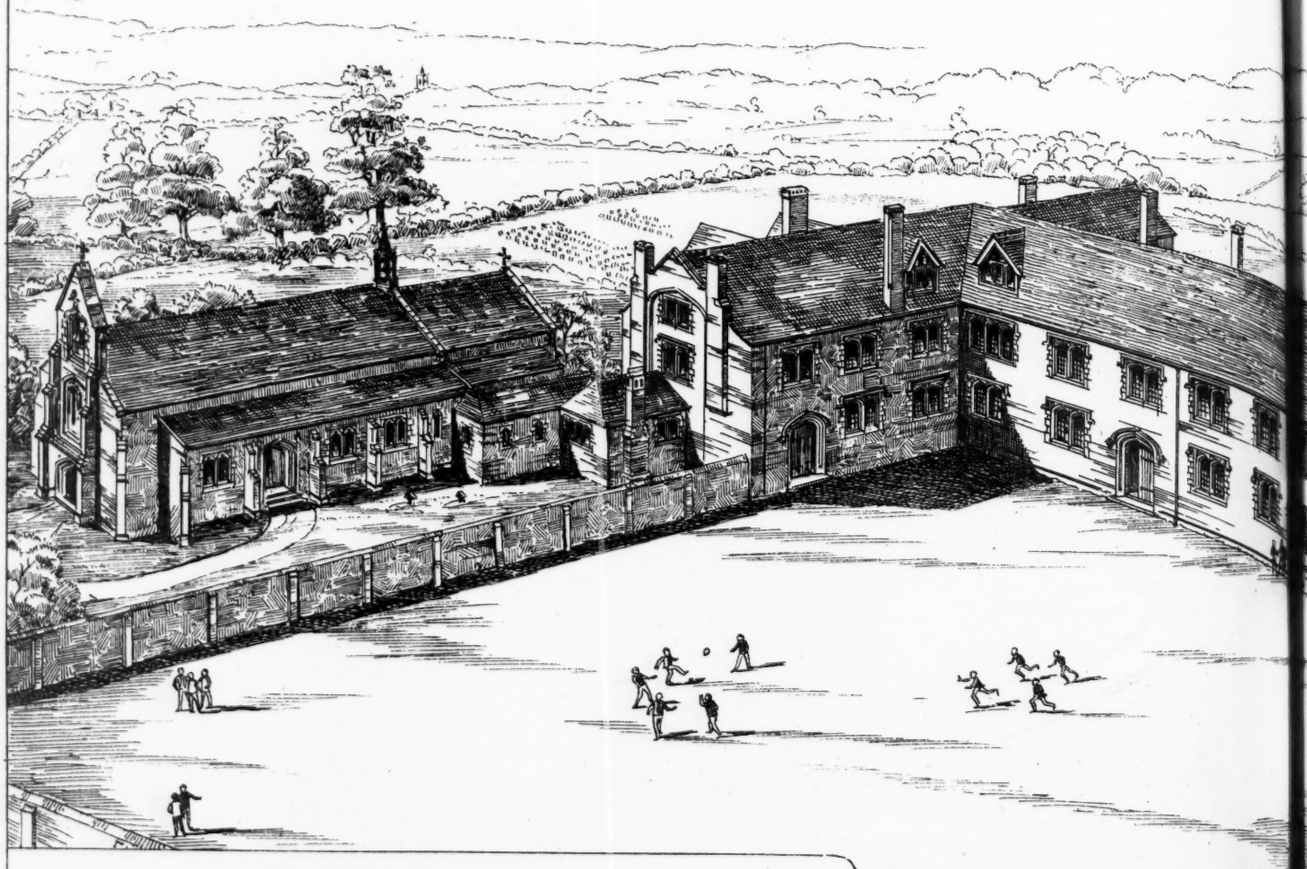


PHOTO-LITHO. SPRAGUE & Co. LONDON

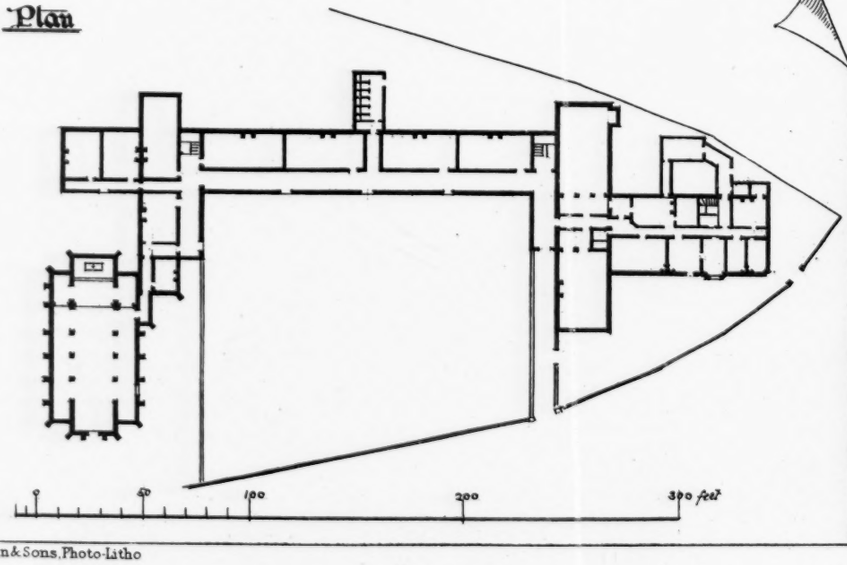
REMINISCENCES OF THE ARCHITECTURAL ASSOCIATION EXCURSION, 1885.

S^t Mary's College Woolhampton Berks.

Mr. Fredk. A. Walters, Architect.



Plan



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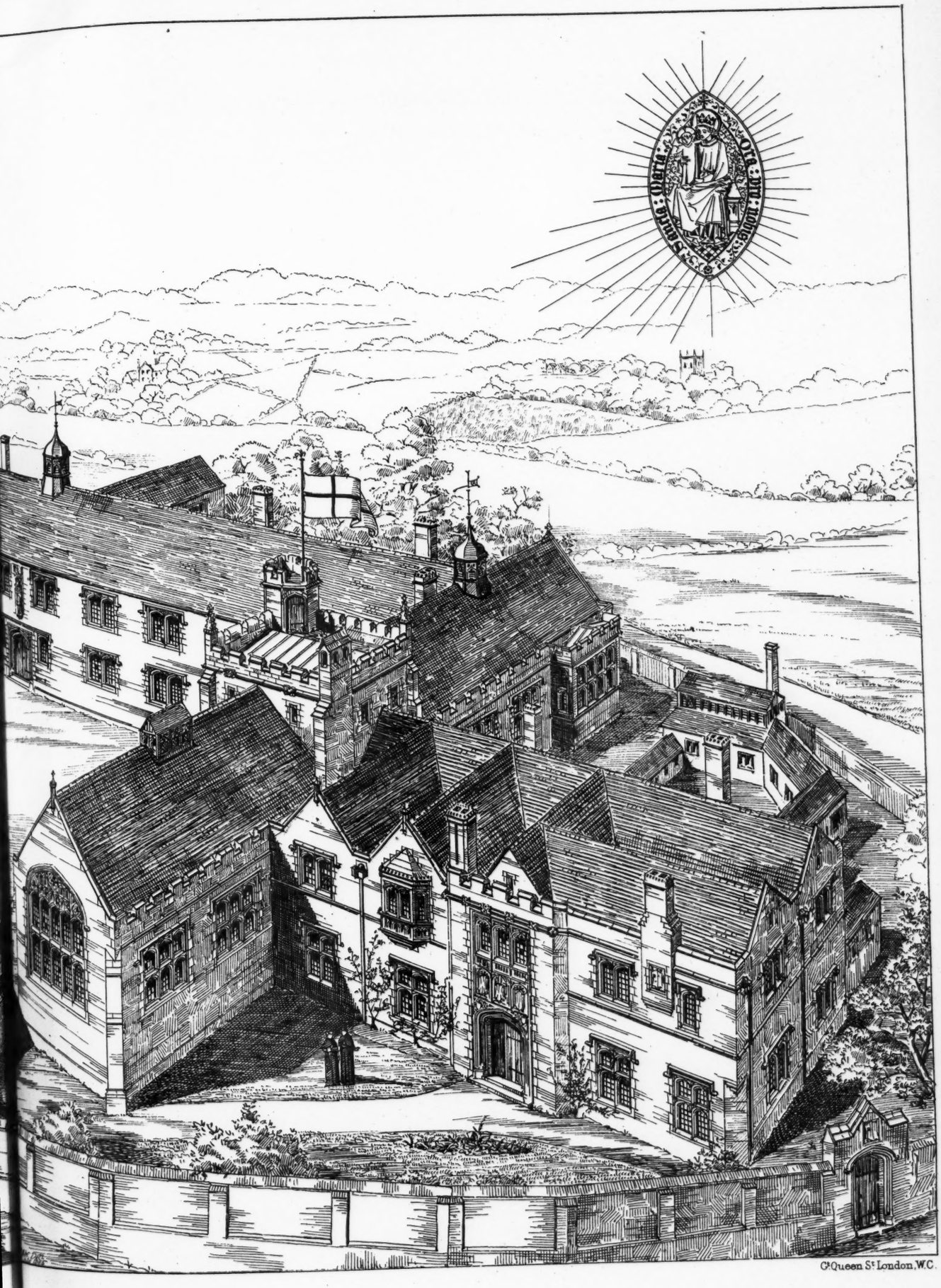

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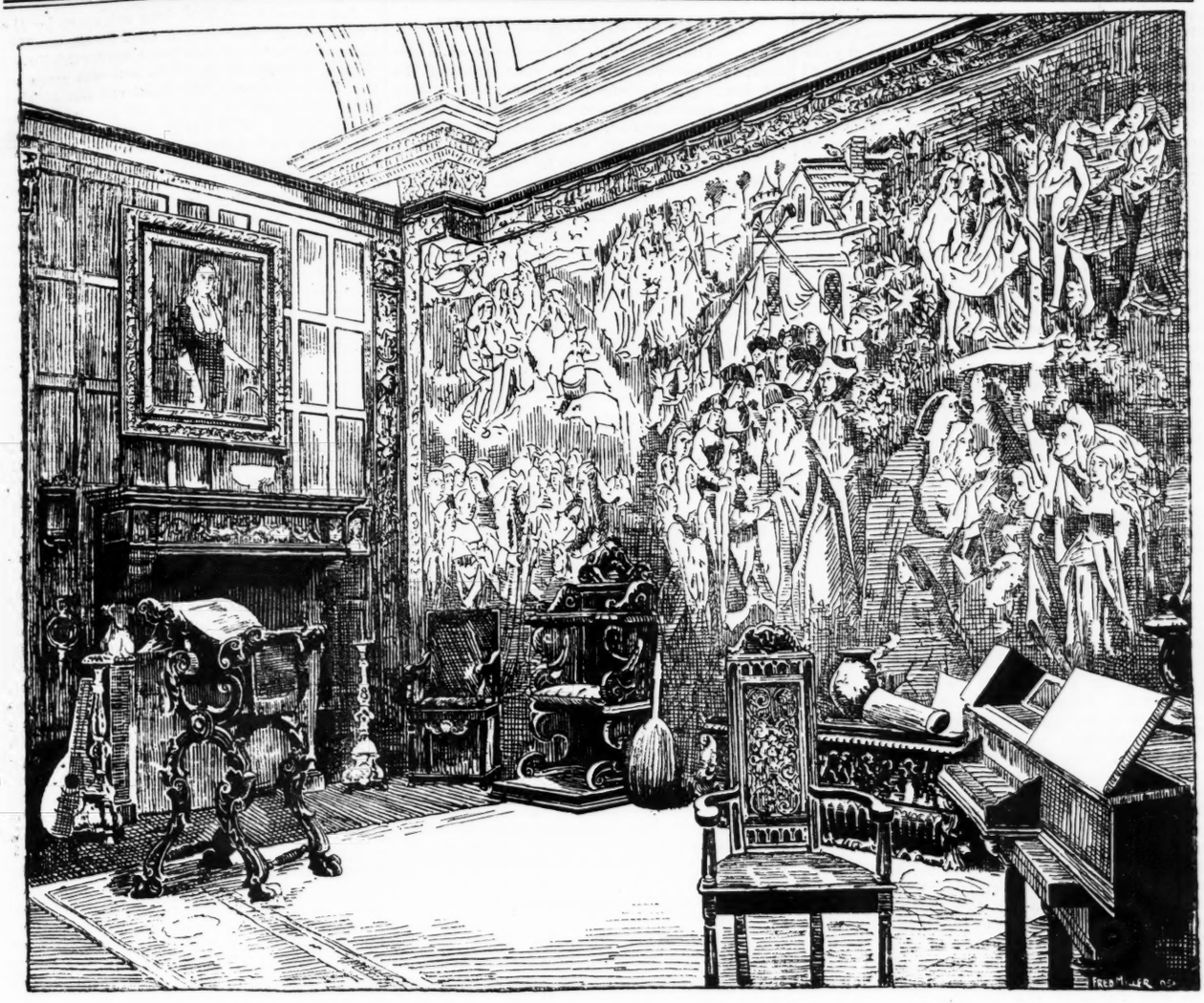

A SIXTEENTH-CENTURY ROOM AT THE INVENTIONS EXHIBITION.

THE subjoined sketch gives a view of one of the three rooms arranged by Mr. Geo. Donaldson. We have selected the sixteenth-century room as being the most interesting of the three. The best traditions of the Middle Ages (the golden ages for handicraftsmen) had not quite died out, though partly modified by the revived Classicism of the Renaissance. The furniture of this period is sumptuous and elaborate rather than graceful and refined: the chairs are massive and richly ornamented with carving, and contain enough material in them to make three or four chairs of a later period, when "refinement" was the chief quality to be attained. Sumptuousness is the word that best expresses the decoration of the sixteenth century, whether we use it as referring to furniture, textiles, or decoration. The Flemish tapestry covering one side of the room is as fine a specimen as it would be possible to find, and it is in excellent preservation. Kensington Museum possesses three large pieces of tapestry of the same period, which certainly vie with those of Mr. Donaldson's, but it is rarely outside a museum one sees such fine or well-preserved specimens as these two in this sixteenth-century room, portraying the parable of the "Prodigal Son." The chief charm of these old tapestries is their colour; there is something rich and mellow about them which is so satisfactory to the colour sense. The one figured in the sketch swims in sunlight, and breaking into this is a cold indigo blue used in various parts of the work. This blue is used as a shadow on the foliage, not only of the border, but also in the trees that surround the different groups in the picture. The flowers and fruits are worked with crimson, so that the three primaries, carefully balanced, are combined. This method of shading the local colour with positive colour is employed in the draperies of many of the figures, and the effect of shot-silk is obtained in some cases by shading amber with green. Looking at the work generally with half-closed eyes, the colour is blue, crimson, and yellow. The drawing of the figures is quaint, but the chief interest in them is that they show us the dress of the day. The head-dress of the women and the hats of the men are very familiar to us, and we ought to be thankful that historical accuracy was a quality the sixteenth century designers troubled themselves no whit about. The designer of this tapestry clothed the Prodigal Son in out-at-elbow garments of his own time, as he clothed the rest of the folk in the sumptuous apparel he saw on the bodies of those who moved about him. We, in these days, attempt historical accuracy, and perhaps it is as well, for the story of the Prodigal Son, treated with the local accuracy of this sixteenth-century designer, with the trousers and top hat of the male, and the bonnet and crinolette of the female of the present day, would have an indescribably ludicrous effect, even to those who might come three centuries afterwards.

A passing glance may well be given to the Persian carpet (also of the sixteenth century) whose beautiful colours harmonise so well with the tapestry. The centre part has a crimson ground ornamented with the familiar leaf-and-flower ornament, arranged geometrically, and whose prevailing colour is amber and light yellow, varied with dark and middle and turquoise blue, grass green, grey, and cream colour. The border, with a rich juicy cold green ground, has the colours of the centre brought into it. Queen Elizabeth's Virginal, decorated with arabesques in gold on dark green ground with red panels, is worthy of attention.

The other two rooms, one called an eighteenth-century English room with an elaborate architectural chimney-piece ornamented with plaster work and some rather quaint furniture, and a finely-inlaid music-stand for a quartette; and a Louis XVI. *salon*, with its gilt furniture and ormulu decorated cabinet-work, are interesting in a lesser degree, as the historical accuracy of the rooms is somewhat doubtful. Messrs. Wright & Mansfield have lent several of the accessories in these two rooms, and in the *salon* is an elaborately-painted harpsichord lent by Viscount Powerscourt, said to have belonged to Marie Antoinette.

A STEEL STRONG-ROOM FOR A BANK.

WE have had an opportunity this week of inspecting, at Messrs. Chubb & Son's works in Glengall-road, Old Kent-road, a very large and in other ways noteworthy strong-room of steel, which has been made by them for the National Bank of Scotland, Edinburgh, and temporarily erected for inspection prior to being dispatched to its destination. The strong-room, in addition to being the heaviest in proportion to its size yet constructed by Messrs. Chubb, is also believed to possess the thickest walls of any steel room of such a size in use by British bankers. In point of construction, it contains some new and important features, which have been introduced for the first time, and which ensure greater security than has been hitherto obtained. This room is constructed with a triple series of plates, as adopted for many years in Chubb's bankers' safes, giving both toughness and hardness, so that neither the force of blows nor the cutting of drills has any effect. This "compounding" of the plates involved the drilling of no fewer than 1,000 holes in each section, each hole being closed up, and securing the different thicknesses in such a way as to ensure strength. To effect this drilling, the machinery at Messrs. Chubb's works has been running night and day. When the compounded sections were completed they were jointed with one another in a novel and peculiar manner. To insure absolute accuracy, and the matching of all holes, every plate and bar was marked from a template, and then drilled with twist-drills, under a powerful multiple machine. The strong-room is divided internally by heavy steel

partitions into various compartments, these partitions containing cases of non-conducting composition, so that a fire happening in any one part would be isolated. By means of small fireproof doors or manholes (ordinarily to be kept locked) in the partitions, access could be obtained, in case of emergency, from one compartment to another. The room is entered by three massive doors and grilles, measuring 7 ft. by 3 ft. 4 in., and 7 in. thick. These doors weigh about a ton and a half each, and are hung on hardened steel pins, on which they turn with the greatest ease. Apart from the immense thickness of compounded hard and mild steel plates in these doors, the chief feature is the use of Chubb's patent diagonal bolts, as fitted to some of the safes exhibited at the International Exhibition, where they obtained the gold medal. The bolts, shooting out from the edge of the door at opposite angles of 45 degrees, form a powerful dovetail into each side of the frame in which they engage; so that any attempted wedging between the door and its frame simply tends to bind the bolts tighter in their holes. Unlike more elaborate claws, clutches, and interlocking bars, these bolts are perfectly simple in shape, and so, whilst effecting a similar result, are much easier and more certain in their action, and do not involve excessively large bolt-holes in the door-frame. The bolts in each door, twenty in number, weigh 2 cwt., but by careful balancing can be thrown out or drawn in very easily. Besides the points named, there are various secret methods and appliances used in order to defeat all attempts of burglars to enter the room by any known or possible ways of attack. In each vestibule of the three doors is a pair of folding grilles for use during day-time when the doors may remain open; these are self-locking. The inner compartments of the room are fitted with steel treasuries, cupboards, and shelving for the use of officials. The whole strong-room has occupied seven months in construction; it measures 50 ft. in length and weighs close upon 100 tons. It may be mentioned that so accurately were the component parts of this structure turned out by the machinery that when they came to be put together there was found to be only a difference of $\frac{1}{16}$ in. in the total length at the top, the bottom being 50 ft. exactly. By taking off $\frac{1}{32}$ in. from each of the end plates at the top the structure was exactly the size stipulated for. When re-erected in its permanent position it will be encased in immense walls of concrete surrounded by a patrol passage, outside of which again comes the massive stone outer wall of the main building.

To give an idea of the capacity of this steel structure, it may be mentioned that it has been calculated that it would hold 1,250 tons weight of gold bullion, equal in value to over 110,000,000*l.*, — considerably more than the national revenue of this country for a year.

CASE UNDER THE EMPLOYERS' LIABILITY ACT.

SCOTT *v.* OWEN.

IN this action (which came before Mr. Justice A. L. Smith, sitting as Vacation Judge), the plaintiff, a workman unaccustomed to the use of the circular saw, was oiling it under the impression that it was not in motion; the saw was set in motion, and he lost a finger. He obtained judgment against his employer for 50*l.*

Mr. Ruegg, for the defendant, said that as no Divisional Court was sitting, with the permission of his Lordship, he would move this Court for a rule *nisi* to enter judgment for the defendant or for a new trial.

Mr. Justice A. L. Smith doubted whether the application should not have been made in chambers.

Mr. Ruegg said that the grounds of the application were:—(1) That there was no evidence of negligence; there was no evidence that Reeves, the workman in charge of the saw, had set it in motion; (2) Reeves was not a workman for whom the employer was liable under the Act; (3) the plaintiff was guilty of culpable negligence.

Mr. Justice A. L. Smith granted the rule *nisi*, on payment of the 50*l.* into Court.

The Bells of Exeter Cathedral.—A subscription is on foot to re-hang and re-arrange the bells of Exeter Cathedral, by way of a memorial of the Rev. H. T. Ellacombe, the father of bell archæology, whose death we recorded a few weeks since.—*Athenæum.*

"SCAMPED DRAINAGE WORK."

SIR,—The paragraph in my paper at Aberdare, to which you allude in your issue of the 5th inst. [p. 344], was not intended by me to convey, against any class of builder, a charge of wilful malpractice. I would not willingly believe that builders who knowingly insert seriously defective drainage in houses are other than a minority of the profession. But I do believe that the integrity of underground work can only be secured by constant attention on the part of the person ultimately responsible for it, and I do fear that "builders in general" are not yet sufficiently impressed with its importance to give the amount of personal supervision necessary to ensure it. It is the practice of delegating the superintendence of the details of the work to subordinates, who care less, which opens the door to many of the results that I described "even in the best class of houses."

ISAMBARD OWEN.

September 10th, 1885.

BOURNEMOUTH UNDERCLIFF DRIVE COMPETITION.

SIR,—The Bournemouth Improvement Commissioners advertised for competitive plans for the above last May, and although most elaborate printed conditions were issued, no mention was made as to cost, other than a general clause that the commissioners wished for efficiency combined with economy.

Twenty-nine sets of plans, with estimates varying from 22,000*l.* to 116,000*l.*, were submitted, and I now hear that one of the commissioners proposes to reject all plans with estimates over 30,000*l.*

If this is the case, it is most unfair to the engineers who have devoted a large amount of time to the matter, without any guide as to the amount to be spent.

It is only right that the engineer who is to adjudicate on the plans should say which is the best one combining the requirements of the commissioners, as set forth in the conditions of competition, irrespective of any limit of cost. I enclose my card.

A COMPETITOR.

September 9th, 1885.

PROVINCIAL NEWS.

Paulton (*near Bristol*).—The cottage hospital here, which was opened in the year 1872 through the exertions of the late Mr. Mogg, of Farrington, aided by Mrs. Mogg and other personal friends, having, on account of the dilapidated condition of the buildings and the defective sanitary arrangements, become unsuited for its purpose, a new hospital is now in course of erection at the southern end of the village, on a site given by Capt. Molyneux Carter, and on the 3rd inst. the corner-stone was laid by Mrs. Mogg, of Farrington Gourney. It is placed, according to Masonic rule, at the north-east corner of the building, and is lettered on its east face as follows:—

"18✠85. I G M—M M."

In a cavity in the centre of the stone was placed a bottle containing a parchment with the following inscription:—

"18✠85. V.R.—The corner-stone of this hospital was laid on Thursday, the third day of September, one thousand eight hundred and eighty-five, by Mrs. Marianna Mogg, of the Manor-house, Farrington Gourney; Mr. W. F. Unsworth, Associate of the Royal Society of British Architects, of 2, Great Queen-street, Westminster, being the architect; Mr. John Vallis, of Frome Selwood, being the builder; Thomas Williamson Bull, vicar of Paulton, treasurer of the building fund and honorary chaplain." *

The hospital will be erected of local stone and red brick, with a high-pointed roof of Bridgwater tiles. It will contain a men's ward fitted with seven beds, to be called the Kilmersdon ward, after the late Lord Hylton, who erected a similar ward in the old hospital; a women's ward fitted with four beds, to be called the "Julia Hill" ward, after a lady whose family have been great benefactors to the parish of Paulton, and who has herself contributed 350*l.* towards this undertaking; a third ward for any case requiring separate treatment; a patients' convalescent-room, sitting and bed rooms for the lady superintendent, wardsman, and other servants, a surgical and operating room, &c. The total estimated cost of the building,—inclusive of boundary-walls, fences, &c.,—is about 1,800*l.*

* We have been asked by the builder to insert this inscription, and although, as a rule, we cannot comply with such requests, we do so in the present instance in order to point out that there is no society named the "Royal *Society* of British Architects." Mr. Unsworth is an Associate of the Royal Institute of British Architects.

Peterborough.—8,500*l.* was set apart by the Charity Commissioners in 1882 for the erection and maintenance of new buildings for the King's School, Peterborough. The site was given by the Ecclesiastical Commissioners, and at that time consisted of a plot of ground on the Thorpe-road, afterwards exchanged for an admirable and more suitable site on the Park-road, between Granville-street and Huntly-grove. The buildings were not commenced until the beginning of the present year, but the pile is now completed. Mr. J. R. Naylor, of Derby, is the architect. The entire frontage of the building is 184 ft. It has been built of dull red bricks, with white stone dressings, by Mr. John Thompson, Peterborough. In the centre is a substantial tower, pierced at the foot by the main entrance. To the right, at the end of a long wing, stands the main school-room; to the left, in a similar position and attached, the master's house. The whole is built in the Tudor style of architecture. It will accommodate when completed 100 day boys and forty boarders, but the room for the latter is now limited to 28. At the south end, or on the left, as stated, is the master's house, with drawing, dining, and morning rooms. On the other side of his entrance hall is the boys' dining-room, with oak and pitch-pine fittings, the windows looking directly on to the Park-road, and being 35 ft. by 22 ft. in extent. Leading from it is a corridor to a lobby for hats and coats, also containing a lavatory, which in its turn communicates with a corridor running parallel with the main or tower entrance, 63 ft. in length. The main hall is some 14 ft. square, and is surrounded by the master's common room, 14 ft. square, and the main staircase leading to the studies of the scholars. On the other side of the long corridor are three class-rooms 21 ft. by 19 ft. in size, which being passed, the large school flanking the right wing is approached. It has at the east end a large window of plain Perpendicular tracery, filled with cathedral glass. The room is 50 ft. long and 25 ft. broad, plastered walls, with varnished pitch-pine fittings, the ornamental rafters supporting the roof being of the same material. It is about 30 ft. high, and is a spacious, well-ventilated building, lighted by nine plain Tudor windows filled with pale cathedral glass. The west end is so built that it can be at any time broken through in order to join a library, which funds at present have precluded from being erected, at its western extremity. This schoolroom is designed to afford accommodation for 250. At the top of the main landing just mentioned, are the house-master's rooms, at present to be used for an infirmary until the sanatorium and sick-rooms can be built at the back. Passing inwards are to be found the dormitories, which are built on a novel principle. Each sleeper has a little private dressing-box erected at the head of his bed, whilst the bed itself stands in the open room. This combines all the privacy of a cubicle, and at the same time allows of free supervision. The three dormitories measure 77 ft. in length, and are communicable into one another by double swinging doors.

CHURCH-BUILDING NEWS.

Dartmouth.—The chapel-of-ease (built in 1831) to the old parish church of St. Petrox, has just been transformed and rededicated to St. Barnabas, from the designs of Mr. George H. Birch, F.S.A. The building was of the most dreary carpenter-Gothic type then prevailing, and the ascent to it by a path zig-zagging up the cliff, 40 ft. above the road, exceedingly difficult. The entrance was at the east end, the altar being at the west; and, internally, it was a mass of bewildering pews and galleries. The alterations effected have been to build a chancel at the proper east end, the galleries being removed and the roof opened out. Arcades have been built on each side, of brick, and the portion of the roof over the aisles thus formed has been panelled with a wood ceiling divided into panels with moulded ribs, the centre portion over the nave being open to the ridge with an arched panelled ceiling in wood, the old tie-beams and king-posts being cased. A lofty chancel arch of stone, the inner arch being carried on corbels, opens into the new chancel, which is lighted by seven lofty lancet-windows. The chancel is apsidal in plan, with an organ-chamber on the north side. The entrances are still obliged to be at the east end, but an ambulatory, with a lean-to roof, surrounding the

apse, has been added. This shelters the porches and stone staircases leading to the church. The chancel is raised on a crypt, to be utilised for the daily service, and the old altar removed into it. The whole floor of the church has been lowered nearly 13 ft. into the rock, to render the access easier, and a large vestry formed under the organ-chamber, access to this vestry and crypt being from the lower level. Externally two lofty flanking turrets, with slated spires, stand at the junction of the old nave and new chancel, and these are connected by a gallery with a lean-to roof, above which is an open arcade of stone connecting the turrets, and in which is to be placed a carillon. The materials are of local stone throughout, with Box-ground dressings, and the roofs are covered with grey slates. The fittings internally are of pitch-pine, and the roofs stained, but not varnished. The altar frontals have been worked from full-size drawings by the architect by Miss Wellard and Miss Carpenter, of Chelsea-gardens, and the sanctuary hangings and embroidered dossel supplied by Mr. Tattersall, and designed by the architect. Messrs. L. C. Pillar & Sons, of Dartmouth, have carried out these alterations, and the total cost has been a little over 3,000*l.*

Luton.—There has just been erected in St. Matthew's Church, Luton, a new reredos, the gift of Mrs. Wood, widow of the Rev. John Wood, the first incumbent of the parish. It is the work of Messrs. Jones & Willis, of London and Birmingham, and has been put up by Mr. Walter Pakes, of Luton. The material used in its construction is Caen stone. Under each of the three arches which constitute the main feature of the work, is a panel, which is flanked by two columns, one of the red marble of Devonshire, and the other of Greek marble. The middle panel is of dark alabaster, plainly polished, in front of which stands a cross of Sicilian marble; while the others are of Caen stone, relieved with elaborately-carved devices emblematical of the Holy Sacrament.

Bicton.—The foundation-stone of a new church here has been laid by Bishop Bromby. The site of the church was given by Col. Wingfield, and is next to the old burial-ground. It is being erected at a cost of 2,233*l.*, and the erection of the tower will cost an additional 537*l.* The building is designed in the thirteenth-century style, the exterior being faced with Cardiston stone and Shelvock dressings, and the interior with Redhill stone and Shelvock. The principal entrance will be on the south side of the church. The roof will be composed of open timber, stained and varnished. There will be a chancel, vestry, and organ-chamber, the latter being situated underneath the tower. The seats in the chancel-stalls will be of oak, and the sittings in the nave of pitch-pine, the latter accommodating 150 persons. The tower wil be 70 ft. high to the vane, and will be a square structure, the length of the nave 54 ft. by 20 ft. 6 in., and the aisle 18 ft. 6 in. The chancel measures 25 ft. long and 18 ft. 6 in. wide. The nave will be 21 ft. high to the wall-plate. The architect is Mr. A. E. Lloyd Oswell, Shrewsbury, of the firm of Messrs. Oswell & Smith; Messrs. J. & G. Groves are the builders; and Mr. H. L. Whittingham is clerk of the works.

Lyceum Theatre.—This theatre has undergone a complete change in the *motif* and character of decoration, and so far as the department behind the proscenium is concerned, of structural plan. Over the stage the roof has been elevated nearly 20 ft., by which improvement the scenery is now taken up straight out of sight without any rolling or doubling. With regard to the auditorium the old box-fronts have been removed. In their place Mr. C. J. Phipps, F.S.A., the architect under whose entire superintendence the new works have been brought to a conclusion, has introduced a style of decoration somewhat of the character of that of the interior of Her Majesty's Theatre as it appeared before the destruction of that house in December, 1867. The paintings have been executed by hand on a flat ground, panelled in with massive mouldings. All the details of the ornamentation were entrusted to Messrs. Campbell, Smith, & Campbell. Several improvements in the construction of the auditorium have been effected in a manner to interfere very little, if at all, with its original plan. Four of the private boxes at the side of the stage have been removed, and additional space given to the stalls.

Books.

The Builder's and Contractor's Price-Book and Guide to Estimating (*late Bevis's*). London: Scientific Publishing Co. 1885.

THIS price-book is a great improvement on Bevis's. It is more complete and perfect, and has been carefully revised and had many things added to it, making it, in our opinion, as good as other existing price-books; but all price-books that talk of guiding builders and contractors in estimating aim at more than they perform. No price-book exists that is of much use to a builder for this; they may be of use to refer to for some not often met with item; the prices are much too high for any other use to the competing builder. The first section, on plant, machinery, scaffolding, &c., is a very complete and useful one, especially to contractors doing a very large business. In Section 2, Excavator, the prices are very fair until we come to the drain-pipes on page 35. They are given at the gross "Lambeth" list; this would give a builder 40 to 50 per cent. profit, *if he could get it.* It is the same with most of the price-books.

The cartage and horse-hire is just as *low* in price. The prime cost that a builder has to pay to a carman is 11s. per day for a one-horse cart and man; this should be charged 12s. 6d. per day, or 1s. 6d. per hour, as seldom more than nine hours is worked by them.

In Section 3, Bricklayer, the price of 32s. per thousand for bricks is really a prime-cost average and a very fair one, but the gross prices for labour and material that follow are high, 12*l.* per rod being about the present price for brickwork in stocks. The prices for daywork are evidently country ones. A bricklayer is paid 9d. per hour in London and working expenses cost ½d. Where there is a foreman of works nothing less than 11d. per hour will pay a builder, and 9½d. is given. This is clearly an error. Labourer is put at 6d. This is exactly what he is paid; then there is the addition to make for working expenses. Some of these prices want altering.

In the Slater, page 58, the value of Countess slating, 2½ lap, zinc nails, is given at 40s. This is at least 30 per cent. too high.

In the Mason, some of the prices for stone in block are the lowest the builder can buy them at, to which his waste expenses and profit have to be added.

In the Carpenter, the prices for measured work are the best and most fair in the book, though not low enough for estimating in competition.

In the Joiner, the floors are given at impossible prices, the value in competition of the closest for 1 in. floors laid complete being 19s., and for 1¼ in., 23s. per square.

The skirtings are just as high as the floors are low. As to the doors, they are priced as in most price-books, at about 50 to 100 per cent. on prime cost. The prices for staircase work are very good on page 94; while on page 99 *labour only* is priced at nearly the *same* prices.

There is a very complete list of ventilators.

The prices of lead work in the Plumber are high. On p. 141 the rain-water goods are too low, and would not pay a builder. How these excessively low prices creep into a price-book of any kind where the prices are generally so high, it is difficult to imagine.

There are many articles given in Smith and Founder much more fully than some of the other books. Of the rolled iron girders or joists there is a very good list, and really about the lowest and nearest list we have ever seen in a price-book.

Turning to the Plasterer, page 170, we find a very low list of prices for Portland cement work that would not pay,—they are barely "prime cost," for the plain face; the arris is too high at 2½d., and the 1½ in. floors at 4s. are too high.

In the Gasfitter the gas-pipes are given, as usual, at the gross list price, off which there is a long discount, and, when labour and profit are added to the net prices, there is still a large excess. The same may be said of the list of prices for British plate, &c. Gross prices are given when they would leave a fair profit at 15 per cent. discount. Some of the prices in the Painter daywork are exact "prime cost," some three times the cost. There are a few things under "Sundries" that are useful, and the usual memoranda, wages table, &c., are given at the end. Altogether the book is a better one in many particulars than it was as "Bevis's," but possesses, as we have already said, most of the faults that most price-books have, and should, we consider, be revised by practical men of each trade, capable, as so few practical men are, of carefully pricing each item of their own trade, so that there is a fair profit left to the builder, and yet leave the price a fair one to him who has to pay it. There seems to be a fear with most of the books to let the public or those who represent them, the architects, into the secret of the true value of builder's work. This we think a mistake, at least for the honest builder who is willing to do work at a fair price and ordinary profit.

Gasworks, their Construction and Arrangement, and the Manufacture and Distribution of Coal-gas. Originally written by Samuel Hughes, C.E.; revised, re-written, and much enlarged, by WILLIAM RICHARDS, C.E. Seventh edition. London: Crosby Lockwood & Co. 1885.

A TREATISE written thirty years ago on the subject of gas, however ably dealt with according to the best information attainable at that date, would have little other than historic value for the student in 1885. To maintain the efficiency of such a work, it must be served like the knife of the Irishman, that was not only new bladed, but new handled. Such a duty has been performed for this volume of Weale's Rudimentary Series by Mr. Richards, the author of a valuable "practical treatise on the manufacture and distribution of coal gas," which was printed by Messrs. Spon, in a handsome quarto, in 1877.

Since Mr. Hughes wrote, Mr. Richards reminds us, the cost of the production of gas has been reduced one-half, with the result of multiplying the consumption twelve-fold. Advance has also been made, if not so rapidly as might have been anticipated, in that which is, after all, the true economical use of coal-gas, namely the liberation of heat. "The successful application of gas for heating apartments and buildings, for cooking, as well as for producing motive power, are of comparatively recent date; and its superiority for these, as well as for many manufacturing, purposes, is beyond all doubt." As a motor, Mr. Richards thinks that gas will, in many cases, supersede steam-power, on account of superior safety, economy, and facility of application on any required scale. Perhaps of all the economical qualities of gas, whether as an illuminator or as a heater, none is more valuable than its capability of being instantly awakened, at any moment, to its full energy, and as instantly thrown into a state of rest when its activity is no longer required. There is no loss incurred in kindling or in raking out the fire, or in getting up or blowing off the steam. When an occasional, and not a constant, service is required, the economy thus to be secured by the use of gas is very considerable.

The twenty-four chapters of which the volume is composed might have been advantageously grouped in books. They deal with, first, the history and the chemistry of gas lighting; secondly, the construction and details of gas-works and appliances; thirdly, the distribution and application of gas, and the various influences which affect its chemical or photometric value; with some glances at the various methods of producing light.

Among those parts of the book which have a wider interest than the mere technical details, is a chapter on gas-holder tanks, whether constructed of brick, stone, iron, composite materials, or concrete. "The merit of making the first concrete tank is due to Mr. Douglas, of Portsea." The date is not annexed. A tank of 112 ft. in diameter and 26 ft. deep has been built entirely of concrete rendered with Portland cement and sand by Mr. Valon, at Ramsgate, for a cost of 3,500*l.* "But this sinks almost into insignificance when compared with a concrete tank designed and constructed by Mr. George Livesey, at the South Metropolitan Company's works, in the Old Kent-road. The tank is 218 ft. in diameter, and 55 ft. 6 in. deep at the sides. It is formed entirely of concrete, without a brick or a stone in the ordinary sense of the term, or a single yard of puddle, in the whole building. The ground where it is erected is loose running sand, with abundance of water at the depth of 11 ft., and necessarily it would be supposed to be a very costly structure by reason of the soil, and the great depth and diameter of the tank; yet, strange to say, it is

among the cheapest tanks on record, as it cost but 18,500*l.*, which is little more than 9*l.* per 1,000 ft. capacity of the tank." This compares favourably with the cost of the Ramsgate tank, which we make to be about 13*l.* 5*s.* per 1,000 cubic feet for about one-fourth of the capacity of the other. But the difference is simply an illustration of the mathematical law of the different rate of increase of the superficies and the contents; a law to the appreciation of which by Mr. Brunel we owe much of the increased size of our merchant shipping.

Another point of interest, as to which Mr. Richards's remarks might with advantage have been somewhat clearer, regards the difference in both production and consumption of gas due to variation in barometric pressure. "Munich is about 1,700 feet above the sea, and, according to Dr. Frankland, a description of gas that would give the light of 100 candles at London would there only give the light of 91 candles; and if the same gas were burned at Mexico, which is about 7,400 feet above the level of the sea, it would give the light of 61¼ candles only."

Chapter XXI. contains a short account of the electric light, but does not enter into the question of that natural division of the field of practical application which may exist between the distinct sources of illumination. Even where the dynamo machine is most applicable, it not unfrequently happens that it can be driven most economically by a gas-engine,—another illustration of the greater calorific than luminous energy of coal gas. Another point which might with advantage have been mentioned in the volume is the method of applying gas to the maintenance of the even temperature of green-houses. Coal gas, indeed, is so fatal to plant life that no flowers can be kept alive in rooms where gas is burned. But by the introduction, in a little closet on the outside of a greenhouse, of a small tank of water heated by a gas jet, and connected with water-pipes within the greenhouse, the advantage of an economical source of heat, that requires no attention, may be combined with the perfect freedom of the interior of the greenhouse from any of the products of combustion, —excepting, of course, heat, if that may be so designated.

We can heartily recommend Mr. Richards's little work to, as we should anticipate, a pretty general class of readers.

VARIORUM.

FROM the City and Guilds of London Institute for the Advancement of Technieal Education (offices: Gresham College, London, E.C.), we have received a bulky "Programme of Technological Examinations" for Session 1885–86. Examinations are to be held in no fewer than thirty-five subjects, "but no candidate may be examined, in the same year, in more than one subject." A new subject, "Brickwork and Masonry," has been introduced into the programme, Mr. John Slater, B.A., being the examiner. Other subjects of immediate interest to our readers are "Carpentry and Joinery" (Mr. Thomas Blashill, examiner), and "Plumbers' Work" (Mr. W. Eassie, examiner). Arrangements are made whereby the Institute will afford facilities for carrying out an examination in any of the subjects, wherever a class for instruction is formed, or a sufficient number of candidates present themselves, provided a local committee undertakes to carry out the examination according to the rules laid down. The examination will be in two grades: I. Ordinary; II. Honours. The Ordinary Examination is intended principally for apprentices and journeymen; the Honours Examination for foremen, managers, and teachers of technology, but candidates may enter themselves for either grade, except in certain subjects. There is no limit of age, and no fee for examination. The examinations will be held in May, 1886. The "Programme," which gives syllabuses of the examinations and much other information as to the mode of procedure, should be obtained by employers of labour and others who may be desirous of doing something for the advancement of technical education and industrial prosperity.——A well-printed "Pictorial Supplement" to the *Torquay Directory and South Devon Journal* has been sent to us. It contains a number of well-executed wood engravings of that pleasant seaside resort, together with extracts from articles which have appeared in various journals (the *Builder* amongst them) on the sanitary and other merits of the town.——Mr. Edward Stanford, of Charing-cross, has sent us a new edition of his Map of the new London Boroughs, which defines in colours the boundaries and sub-divisions of the new boroughs. On the appearance of the first edition, we commented (vol. xlviii., p. 253) upon some of the anomalies of metropolitan boundaries, and though these are only too apparent in the present map, we are pleased to see that the Boundary Commissioners have not sanctioned the extraordinary boundaries of electoral divisions which were proposed in some quarters of the metropolis, and of which we spoke on the occasion referred to.—— "Chantrey's Peak Scenery, or Views in Derbyshire," is about to be re-issued in a handsome form by Mr. Frank Murray, of Moray House, Derby, who has sent us a prospectus of the work. The book will contain twenty-nine well-executed copper-plate engravings by W. B. and George Cooke, after original drawings by Sir Francis Chantrey, together with introduction and brief topographical and historical descriptions by Mr. James Croston, F.S.A.

RECENT PATENTS.

ABSTRACTS OF SPECIFICATIONS.

3,220, Water-closet. J. Friend.

The closet discharge-pipe is closed by a plunger fitting into the conoidal seating. The overflow-pipe is made of metal, and trapped at the top by a cap. A crank is attached to the plunger to work the flushing valve.

6,978, Sewage Receptacle. W. R. Lake.

Sewage enters the receptacle by a pipe being strained through a diaphragm. To allow the liquid to run into the sewer an arrangement of levers, &c., is provided by which the air in one of the pipes is compressed, and this pressure causes the liquid to flow into the sewer.

7,499, Hack Covers for Bricks. W. S. Codner.

The covers are made of sheet iron, either plain or corrugated. They are bent at an angle, and have flat-bottomed stretchers of sheet iron spanning the open space underneath. If preferred, the covers may be bent over in a curved form instead of at an angle.

7,723, Hot-water Heating Apparatus. P. Dalton.

The pipes are intended to sustain a high internal pressure, and are jointed by forcing the coned end of one tube into the flattened end of the other by means of sockets, with right and left handed screws. A small portion of the system is contained in a furnace, and the pipes are disposed variously as may be required. The whole is maintained full of water, and is fitted with relief valves, &c., connected with the filling cistern.

8,256, Concrete Walls. B. Reynard.

The faces of the walls are composed of thin slabs, on the inner face of which dove-tailed grooves are formed to receive the edges of vertical bonding slabs. The wall is built without the use of temporary boarding, the concrete being filled in as the sides rise. Additional dovetailed grooves may be made in the slabs to act as a further bond if wished. In retaining or dock walls, faced with a single layer of slabs, the bonding slabs are held by being widened out in the concrete.

9,782, Decorating Mirrors. M. T. Sharpe.

A design is pencilled in reverse on the back of the mirror and the silver within the outline scraped off; the clear part is then rubbed with sand-paper and the design is painted in oils. The design is looked at through the glass and cannot be injured from the front.

12,712, Felt for Roofing, &c. S. Frankenberg.

Woollen rags or manilla rope made into a pulp and mixed and boiled with mastic resin, beeswax, ground leather-cuttings, ground cork, and pitch which has been rendered inodorous by adding resin-oil, varying according to the quality of felt required. The pasty mass is passed through heated rollers, to form it into strips or sheets, which are then sprinkled with ground slag and finished by passing through wooden rollers.

12,787, Raising and Lowering Windows. W. Corteen.

Cords are attached to the sashes and carried over pulleys at the top. They are then brought round so as to form a continuous band which may be moved by turning the pulleys round by a handle from outside the frame. A toothed wheel may be fixed on the same axle as the pulley, a detent pressed down by a spring engaging with it and stopping the sash at any required point; or a spring bolt may be used entering a hole in the sash and being withdrawn by pulling the cord.

16,968, Wrought-iron Window-frames. J. Griffin.

The bars are united together and to the window frame by means of angle pieces or bosses of malleable iron, steel, and secured by copper rivets.

10,290. Cathead Hoist. J. Formby and C. Keizer.

The cathead is extended or withdrawn by means of a screw actuated by reversing bevil gearing.

APPLICATIONS FOR LETTERS PATENT.

Aug. 28.—10,197, T. Robottom, Revolving Screens for Screening Stone.—10,211, H. Glendining, Springless Locks and Latches.—10,213, A. Feist, Swing Joint for Pipes.—10,224, F. Baxter, Apparatus for Automatically Shutting off the Supply of Water to Cisterns, &c.

Aug. 29.—10,235, G. Kyte and A. Williams, Gully Grids and Sewer Traps.—10,249, J. White, Water-waste Preventing Cisterns.—10,263, G. Walker, Laying Wood-flooring or Pavement, Staircase Treads and Landings.

Aug. 31.—10,282, T. Beverley, Improvements in Blowing, Ventilating, Exhausting.—10,288, W. May, Flush Sash Lifts.—10,314, E. Douglas, Gritting Marble.—10,321, B. Mills, Improvements in Ventilators or Blowing Machines.

Sept. 1.—10,322, H. Thomas, Joints of Stoneware and other Sanitary Pipes.—10,339, M. Shelbourn, More efficiently Carrying Water off Roofs.—10,344, J. Rowbotham, Improvements in Water Meters.—10,347, G. Blake, Improved Sash-fastener.—10,349, J. Scholes and E. Hall, Ventilating Water-closets, &c.—10,356, W. Barlow, Improved Construction of Portable Forges.—10,362, G. Butehard, Manufacture of Cement.—10,365, T. Glover, Stench Traps or Gullies.

Sept. 2.—10,379, J. Peachey, Sanitary Urinals and Disinfectants.—10,409, H. Gardner, Compound for Preventing Rust or Decay in Wood, Metal, &c.

Sept. 3.—10,411, W. Bruce, Fixing Rain-water Waste and Soil Pipes of Iron and Composition.—10,416, J. Shanks, Improvements in Water-closets.—10,446, G. Bird, Paving Bricks.—10,454, W. Lake, Cement for Paving and other purposes.

PROVISIONAL SPECIFICATIONS ACCEPTED.

7,647, A. Bingemann, Improvements in Locks, Catches, and other Fastenings.—8,490, F. Holloway, Ventilated Water-closet Basin.—8,655, V. Klán and R. Lietz, Improvements in Sash Windows, &c.—8,874, R. Stanley, Improved Method of Preparing and Burning Bricks, Tiles, &c.—9,021, J. Spence, Construction of Roofs.—9,097, D. Macdonald, Improved Bricks.—9,222, A. Fullicks, Blocks and Slabs for Structural and Ornamental Purposes.—9,469, W. Macfarlane, Closets and Urinals.—9,625, J. Kenyon, Securing Knobs or Handles to the Spindles of Locks or Latches.—9,703, W. Youlton, Sliding Window Sashes.—9,756, J. Ostins, Fastenings for Windows.—339, J. Lorrain, Heating, Cooling, and Ventilating.—8,877, J. Sturrock, Apparatus for Flushing Water-closets.—8,154, W. Joy, Manufacture of Cement.—9,519, C. Winn, Water-closet Apparatus.—9,610, F. Gibbons, Manufacture of Tesseræ and Mosaics.—9,617, J. Morrel, Improvements in Dustbins.—9,917, C. Longbottom, Securing Door Knobs or Handles.—9,942, G. Beadon, Improvements in Doors and Door Fastenings.—9,998, C. Wharton, Self-acting Window Sash Fasteners.

COMPLETE SPECIFICATIONS ACCEPTED.

Open to opposition for two months.

13,738, J. Carruthers, Folding Shutters for Shop Windows, Doors, &c.—14,324, P. Justice, Furnaces for Burning Cement, &c.—14,896, T. Walter, Flushing Apparatus for Water-closets.—15,017, H. Williams, Mechanism for Raising, Lowering, and Securing Sliding Window Sashes.—15,314, J. C. and P. S. Spooner, Supplying Water Cisterns with Disinfectants.—15,726, W. Cliff, Constructing Glazed Brick Walls.—505, M. Syer, Syphon Water-waste Preventers.—9,210, W. Frost, Improvements in Window Sashes and Frames.—9,220, W. Scott-Moncrieff, Construction of Water-closet Apparatus.—14,316, R. Willis, Preparation of Wood before Varnishing, Polishing, and Painting same.—17,062, J. Whitehouse, Metallic Handles for Cabinet and other Furniture.—2,731, E. Deacon, Door Locks.—8,202, W. Hunter, Damper for Regulating the Draught in Fireplaces, Brick Kilns, &c.—9,087, A. Reddie, Compounds for Preserving Stone.

Quarry House, Frindsbury.—With reference to this interesting house, of which we gave a view a fortnight ago [p. 307], the *Chatham and Rochester News* says,—"All should try and visit this little-known house before it is destroyed. It is a very great pity that so interesting a building as this should be doomed to destruction, and it is only right to raise a voice against it; but if it must go,—and, on account of its position, there seems little hope of saving it,—would it not be possible for the materials to be preserved and set up again as a museum, which Rochester does not possess, to the shame be it said of so venerable a city? The property belongs to the Bridge Wardens. Surely so important a body could do something towards saving from utter destruction so interesting a relic of former days."

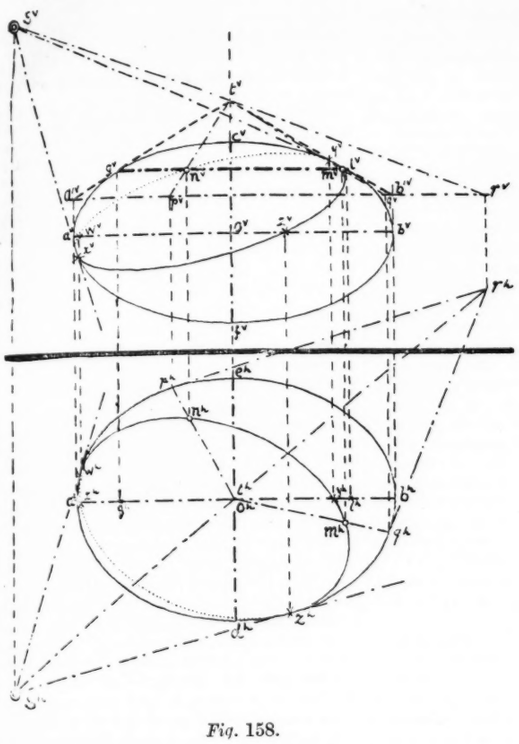

Fig. 158.

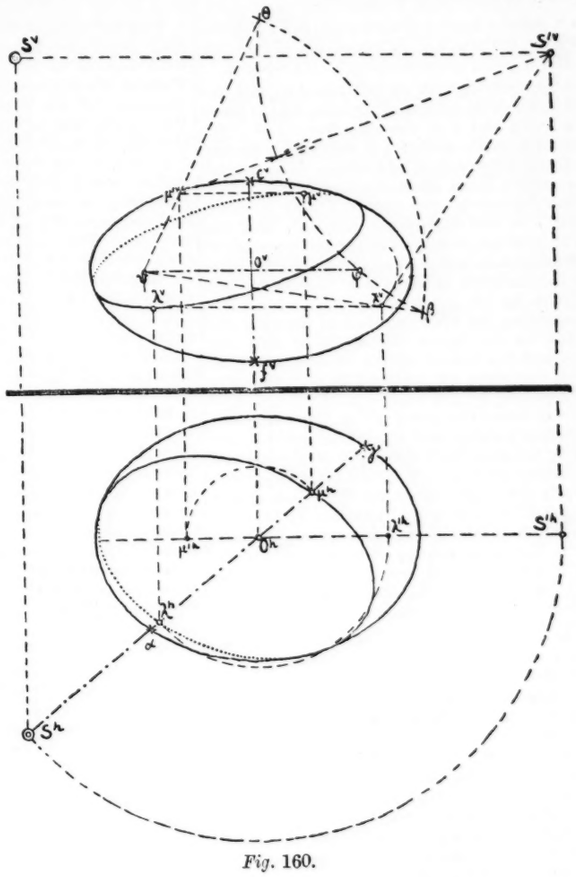

Fig. 160.

The Student's Column.

DESCRIPTIVE GEOMETRY.—PART II.

XVI.

Find the curve of contact of any surface of the second degree with a circumscribed cone of which the vertex S *is given.*

THIS problem has to be solved when delineating the shade of a surface of the second degree lighted by a candle.

Surfaces of revolution such as the ellipsoïd of the preceding paragraph are but special cases of the surfaces of the second degree, and, in strictly logical sequence, we should have begun by considering the more general class of surfaces before studying a special case. We have not done so for two reasons: firstly, because surfaces of revolution are far more commonly met with in architecture than the more general class of surfaces to which they belong; secondly, to be able to thoroughly comprehend the methods used in dealing with surfaces of the second degree in their general form, it is requisite to be well acquainted with the science of conic sections: we must, therefore, omit, for our readers' sake, the scientific reasons of the methods employed, and content ourselves with giving only the practical operations.

We shall assume that the surface we have to deal with is an ellipsoïd in its most general form (see fig. 158). The largest section of this surface parallel to the elevation plane is the ellipsis we see on the elevation; the largest section parallel to the plane of the plan is the ellipsis we see on the plan; a vertical section of the surface passing through the centre O and perpendicular to the elevation plane will give us another ellipsis. The axes $a\ b$, $d\ e$, and $c\ f$ of these three ellipses are the three axes of the ellipsoïd. The only difference between this surface and the ellipsoïd of revolution already studied consists in the three axes being of unequal dimensions, whereas in the ellipsoïd of revolution two of the axes are equal, so that one of the directing ellipses becomes a circle.

Any horizontal section of the ellipsoïd, such as the one projected in elevation on the straight line $g^v\ l^v$, is an ellipsis *similar* to that on the plane, but, of course, smaller. Any sections of the surface by planes passing through the vertical axis $f\ c$ are also ellipses, and it could be proved by algebraïcal calculation that the tangents to all these sections on points at the same level meet in a point t of the axis $f\ c$. In other words, the point t in our drawing is the vertex of a cone tangent to the ellipsoïd all along the horizontal section $g\ l$.

Now, if we are asked to find on the horizontal section, $g\ l$, the points of contact of the cone of vertex S with the given ellipsoïd, we can use the same method as when we had to deal with a parallel of a surface of revolution. If we take from the given point s, planes tangent to the cone of vertex t, these planes will be also tangent to the ellipsoïd on some points of the section $g\ l$, which is the base of the cone t.

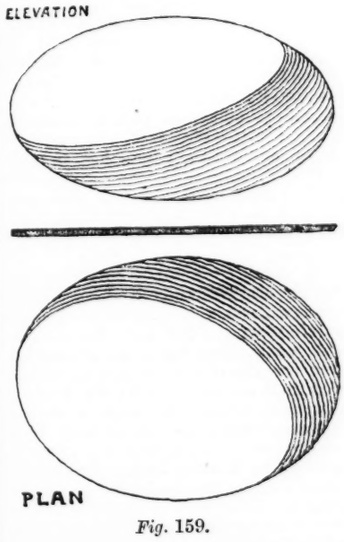

Fig. 159.

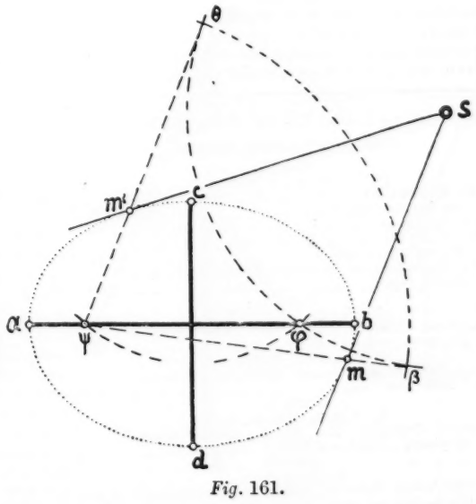

Fig. 161.

To avoid drawing the section $g\ l$, we prolong the generators of the cone to the level of the horizontal plane $a^{1v}\ b^{1v}$, because then the base of the cone will be an ellipsis *identical* to the one we have already drawn on the plan. We remind our readers that to find the tangent planes, we must joint the point s given with the vertex t of the auxiliary cone; this line prolonged to the plane of the base of the cone gives us the point r, through which the traces $r^h\ p^h$ and $r^h\ q^h$ of the tangent planes will pass. We get thereby the cone's generators of contact $t\ q$ and $t\ p$, the elevations $t^v\ q^v$ and $t^v\ p^v$ of which intersect the horizontal line $g^v\ l^v$ in the points $n^v\ m'$, which are the elevations of the points of contact with the ellipsoïd. From $n^v : n^v$ we can deduct the plans n^h and m^h. By repeating this operation for a series of horizontal sections, we would get a number of points which would allow us to draw the curve of contact, or, say, the shade of the ellipsoïd when lighted by a candle placed in s. To avoid confusion, we have shown the constructions for finding some points of the curve in fig. 158, and we have given apart the shaded ellipsoïd in fig. 159.

The points of the curve of contact which touch the outlines of the elevation, such as $x\ y$, or the outline of the plan, such as $w\ z$, are at once determined by tangents from s^v or from s^h, as seen in fig. 158.

The highest and the lowest points of the curve are on the section of the ellipsoïd by the vertical plane standing on the line $s^h\ o^h$ (see fig. 160). We could draw this section, and then the tangents to it; but as we have the axes $\alpha\ \gamma$, and $f^v\ c^v$ of this ellipsis, there is a method based on the properties of conic sections which allows us to find the points of contact λ and μ without drawing the ellipsis. We have carried out this construction by rotating the point s, as shown in fig. 160, so as to render the plane of the section parallel to the elevation.

As this method of finding the point of contact

to a conic section may be found useful hereafter, we give it to the reader in fig. 161.

From a point s draw a tangent, s m, to an ellipsis: the axes, a b and c d, of which are given, and mark the point of contact, m, of the tangent.

Firstly, from c, with an axis equal to half the axis $a\ b$, we draw an arc of a circle, which gives us the foci ϕ and ψ of the ellipsis.

Secondly, with radius $s\ \phi$ we draw a circle; from focus ψ as centre, and with a radius equal to the axis $a\ b$, we draw another circle, which cuts the former in the points θ and β. The tangent $s\ m$ will bisect the arc $\phi\ \beta$, and the point of contact m will be at the intersection of the tangent $s\ m$, with a line joining focus ψ to point β. Another tangent $s\ m^1$ bisects the arc $\phi\ \theta$. (See fig. 161.)

In applying the above method of drawing the tangents to the figure 160, so as to find the highest and the lowest points of the curve of contact, the point s is replaced by $s^{1\nu}$, the axis $a\ b$ is replaced by the axis $a\ \gamma$, the point m of contact is either the point $\mu^{1\nu}$ or the point $\lambda^{1\nu}$. The highest point μ, and the lowest point λ, are found by rotating back the plane of the section to its former position, μ^{1h} comes then to μ^h and $\mu^{1\nu}$ to μ^ν; the same occurs for λ^{1h} which comes to λ^h, and $\lambda^{1\nu}$ comes to λ^ν. (See fig. 160.)

The same method we have used in this problem for determining the shade of an ellipsoïd when lighted by a candle, can be applied to a hyperboloïd, and to a paraboloïd with only slight modifications.

Find the curve of contact of any surface of the second degree with a circumscribed cylinder parallel to a given straight line.

This problem has to be solved when delineating the shade of the surface when lighted by the sun's rays.

The method to be followed is identically the same we have employed in the former problem, the only difference is that from the vertex t of the auxiliary cone a parallel to the given line or the ray of light is produced to get the point r on the base of the cone; we can therefore leave the reader the task of delineating this shade without giving him any further figure. Students who are well acquainted with conic sections will do well to find also the shades of hyperboloïds and paraboloïds, but what we have given will suffice for practical purposes.

RECENT SALES OF PROPERTY.

ESTATE EXCHANGE REPORT.

AUG. 25.

By WORSFOLD & HAYWARD.

Kent, Monks Horton—Higham Hill Farm, containing 32a. 3r. 27p., freehold	£1,400
Cockash Farm, containing 7a. 0r. 22p., freehold	410
Stanford—Gymminge Brook Farm, containing 20a. 0r. 23p., freehold	1,110
An Enclosure of Freehold Land, containing 4a. 3r. 10p	350

AUG. 31.

By JAMES STEVENS & CO.

Plumstead—Nos. 15, 16, and 17, Slade Cottages, 33 years, ground-rent 5*l.*	165

By PATERSON, KERR, & CO.

Bowes Park, Southgate-road—Freehold residence, "Belle Vue"	1,000

SEPT. 1.

By MARCH, MUNCY, & CO.

Doctors' Commons—No. 42, Knightrider-street, 13 years, ground-rent 70*l.*	165

SEPT. 2.

By RICE BROS.

St. Giles's—22, Great St. Andrew's-street, freehold	1,200
Peckham—Ground-rents of 24*l.* 10s. per annum, reversion in 43 years	615
Poplar—162A, Chrisp-street; 1, Cording-street; and the "Anchor" Beerhouse, freehold	1,000
Bethnal-green—1 to 6, Peel-grove, 953 years, ground-rent 18*l.*	1,815
96, 98, and 100, Cyprus-street, 16 years, ground-rent 6*l.*	425

By FULLER, HORSEY, SONS, & CASSELL.

Bermondsey—209, 211, and 213, Weston-street, and the Soap and Oil Works adjoining, freehold	4,100

SEPT. 3.

By DRIVER & CO.

Chingford, High-road—Freehold Building Land, containing 3a. 2r. 5p.	5,000
Forest-road—A Corner Plot of Freehold Land	125

By PHILLIPS, LEA, & DAVIES.

Oxford-street—10, Winsley-street, 26 years, ground-rent 22*l.* 10s. per annum	450

Proposed Artisans' Dwellings at Liverpool.—At a recent meeting of the Insanitary Property and Artisans' Dwellings Committee, the following resolution was adopted:—"Although some of the plans submitted show considerable merit, not one of them is in complete accordance with the conditions of the competition, requiring that the buildings must in all respects comply with the building regulations in force in this city, and the committee regret that they cannot recommend that either prize be awarded by the Council."

Miscellanea.

The Liverpool Water Scheme.—Considerable discussion has taken place at Liverpool with regard to the relative positions of Mr. Thomas Hawksley and Mr. Deacon in the construction of the Vyrnwy waterworks, and on Wednesday last, at the adjourned meeting of the City Council, Sir James Picton moved:—"That it be an instruction to the Water Committee immediately to arrange with Mr. Thomas Hawksley to take the entire superintendence and responsibility of the works at Vyrnwy and the pipe line, according to the agreement between him and the Corporation dated the 2nd of March, 1881." The Chairman of the Water Committee (Mr. Bower) having stated that Mr. Hawksley is recognised by the Committee as engineer-in-chief of the waterworks, Sir James Picton withdrew his motion, on the assurance of Mr. Bower that the duties of Mr. Hawksley and Mr. Deacon would be defined to the satisfaction of the Council. It appeared, in the course of the discussion on the subject, that Mr. Deacon was appointed engineer of the works "in conjunction with" Mr. Hawksley, and the question arose whether Mr. Deacon was or was not "joint engineer" of the works. The Chairman of the Water Committee answered this question in the negative, and said that the agreement was that Mr. Deacon should give his time to the supervision and carrying out of the work in conjunction with Mr. Hawksley, but not as joint engineer.

The Willesden Infectious Hospital Huts. At the present moment, when sanitary authorities are being pressed to make arrangements for isolating cases of cholera should that disease make its appearance in our midst, the Willesden portable hospitals, consisting of a framework covered with the well-known Willesden paper and canvas, deserve notice, as offering very substantial advantages in connexion with the provision of temporary buildings for isolation purposes. They can be erected with great rapidity, and they are, compared with certain other means of isolation, by no means costly. They can be well ventilated, and may be regarded as adapted to by far the greater number of months in the year in our climate. With regard to all temporary hospital provision, we cannot omit to point out that those authorities and other bodies who intend to resort to them must remember that a site has to be in readiness, that drainage and water-supply and other requisites are needed, and that these cannot be provided on the spur of the moment, although the hospital itself may be ready for erection.—*Lancet*.

Liverpool Architectural Society.—The eighth meeting of the Junior Debating Club in connexion with this Society was held on Monday evening last, the 7th inst., Mr. J. S. A. Mercer in the chair, there being a fair attendance. After the election of a new Secretary and other business connected with the Club, it was unanimously decided to hold a winter session. An animated discussion then took place as to the most advantageous way of varying the proceedings, it being finally decided for the present to confine the meetings to papers and discussions. The next and final meeting of the session will be held on the 21st inst., when Mr. Goodall will read a paper entitled "A Few Notes on Plaster Work."

The Proposed Undercliff Drive at Bournemouth.—With regard to this competition (see p. 311, *ante*), it was resolved at the last meeting of the Bournemouth Commissioners:—"That Sir Joseph Bazalgette be employed to assist the commissioners in deciding upon the merits of the plans for the undercliff drive, with the view to the award of the premiums offered, and further to advise the Board as to the most suitable plan for the Board to adopt either in part or as a whole for Bournemouth, at a fee of 200 guineas; and that a copy of this resolution, under the seal of the Board, be forwarded to him."

University College, London.—The Gilchrist (Entrance) Engineering Scholarship at the College is open for public competition on the 28th of September and following days. The Scholarship is of the value of 35*l.* per annum for two years, and candidates must be under nineteen years of age on the 1st of October. The subjects are mathematics, mechanical drawing, use of tools, &c., several of them being optional. Full particulars can be obtained on application to the secretary of the College, Gower-street, W.C.

Dordrecht.—In Dordrecht there is something new, or rather something very old, in every street. The houses are tall and fantastically gabled, and as the streets are mainly very narrow, one can take a walk in the grateful shade on the hottest summer day. Nine-tenths of the houses are at least two hundred years old, and many of them are a century and a half older. In many of the busier streets, and along most of the canals, the old gables lean totteringly forward, as though to meet their venerable friends on the other side of the way. The builder's men were very gingerly demolishing a fine gabled old place, coloured a mellow russet-brown, which was in danger of falling down, owing to some settlement in the sandy shifting soil. Great figures of beaten iron upon the front attested that it was built in 1580. Every now and then, in the streets of Dort, I came upon a house large enough to have looked well in an English park. A double flight of steps, well-nigh wide enough for the passage of the traditional coach-and-six, led up to a massive front door, behind which, when it was occasionally open, I caught a glimpse of a hall ample enough to hold an "eligible detached villa residence." Sometimes a coat of crowded quarterings was floridly sculptured above the broken pediment of the door; sometimes a bit of allegorical carving ornamented the windows. There are very few old towns anywhere which have retained the olden homes of the departed merchant princes in such numbers or in such admirable preservation as Dordrecht.—J. Penderel-Brodhurst in *Cassell's Family Magazine* for September.

Changes in Rome.—In order to open another wide street, to lead from the Argentina Theatre to the Bridge of the Regola, which is now in building, the Roman Municipality have already announced that the sum of 1,721,500 lire is to be expended on the requisite expropriation of the houses to be demolished, which are those in the Via Arco dell' Annunziata, del Muro Nuovo, the church of St. Anna del Falegnami, with the adjacent Hospice of Tata Giovanni, for orphan boys, established in 1815. The church dates from the time of Leo X., and also the dwellings in the street and square of St. Elena. The little church of St. Elena Imperatrice will likewise be demolished, but in compensation it is proposed to re-consecrate the ancient church of SS. Cosma e Damiano, belonging to the Guild of Barbers. It is further proposed to construct large barracks near the late Roman College to cover the entire islet of land between the Via Pia di Marmo, Via del Gesù, and the Altieri Palace, consequently the Church of St. Marta, of the Augustinian nuns, which has not been open for public worship for many years, and the convent itself, will be swept away, as will also the Church of St. Stefano del Cacco, a very antique structure. The barracks for the gendarmes in the Prati di Costello, are nearly ready for occupation. The edifice is composed of four immense buildings, enclosing a large courtyard, but isolated one from another. The architecture is in the Lombard style, with large double windows and embattled roof.—*Tablet*.

Lighthouse Illuminants.—After twelve months of experiments at the South Foreland, the Trinity House Committee have made their report upon the relative merits of electricity, oil, and gas as lighthouse illuminants. The committee sum up their opinion thus:—

1. That the electric light as exhibited in the A experimental tower at the South Foreland has proved to be the most powerful light under all conditions of weather, and to have the greatest penetrative power in fog.

2. That for all practical purposes the gas-light as exemplified by Mr. Wigham's multiform system in B experimental tower, and the oil-light as exemplified by the Trinity House Douglas six-wick burners in multiform arrangement up to triform in C experimental tower, when shown through revolving lenses, are equal light for light in all conditions of weather; but that quadriform gas is a little better than triform oil.

3. That when shown through fixed lenses, as arranged in the experimental towers, the superiority of the superposed gas-light is unquestionable. The larger diameter of the gas flames, and the lights being much nearer to each other in the gas-lantern, give the beam a more compact and intense appearance than that issuing from the more widely separated oil-burners.

4. That for lighthouse illumination with gas the Douglass patent gas-burners are much more efficient and economical than the Wigham gas-burners.

5. That for the ordinary necessities of lighthouse illumination mineral oil is the most suitable and economical illuminant, and that for salient headlands, important landfalls, and places where a very powerful light is required, electricity offers the greatest advantages.

Surveyorship, Bootle.—At the meeting of the Bootle Town Council on Wednesday, Mr. John Alexander, Borough Surveyor, tendered his resignation, which was accepted.

PRICES CURRENT OF MATERIALS.

TIMBER.	£. s. d.	£. s. d.
Greenheart, B.G. ....ton	6 10 0	7 10 0
Teak, E.I. ....load	12 10 0	15 10 0
Sequois, U.S. ....ft. cube	0 2 6	0 2 9
Ash, Canada ....load	3 0 0	5 0 0
Birch „	3 0 0	4 10 0
Elm „	3 10 0	5 0 0
Fir, Dantsic, &c.	1 10 0	4 10 0
Oak „	3 0 0	5 0 0
Canada	6 0 0	7 0 0
Pine „ red	3 0 0	4 0 0
„ yellow	3 15 0	5 5 0
Lath, Dantsic ....fathom	5 0 0	6 0 0
St. Petersburg	5 0 0	7 0 0
Wainscot, Riga....log	3 0 0	4 10 0
Deals, Finland, 2nd and 1st...std. 100	8 0 0	9 0 0
„ 4th and 3rd	6 10 0	7 10 0
Riga	7 0 0	8 10 0
St. Petersburg, 1st yel.	10 0 0	17 0 0
„ 2nd „	8 0 0	9 15 0
„ white	6 10 0	11 0 0
Swedish....	7 0 0	17 0 0
White Sea	8 10 0	19 0 0
Canada, Pine 1st	18 0 0	32 10 0
„ 2nd	12 0 0	18 10 0
„ 3rd, &c.	7 0 0	10 10 0
„ Spruce 1st	9 0 0	12 0 0
„ 3rd and 2nd	6 10 0	8 0 0
New Brunswick, &c....	5 0 0	7 10 0
Battens, all kinds	4 0 0	13 0 0
Flooring Boards, sq. 1 in.—Prepared, first	0 9 0	0 13 0
Second	0 7 6	0 8 6
Other qualities	0 5 0	0 7 0
Cedar, Cuba....foot	0 0 3½	0 0 4
Honduras, &c.	0 0 3	0 0 4
Australian	0 0 3	0 0 3½
Mahogany, Cuba	0 0 5	0 0 7½
St. Domingo cargo av.	0 0 5½	0 0 7½
Mexican „	0 0 4	0 0 5
Tobasco „	0 0 4	0 0 6½
Honduras „	0 0 4½	0 0 6½
Rose, Rio ....ton	7 0 0	17 0 0
Bahia....	6 0 0	15 0 0
Satin, St. Domingo .... ft.	0 0 8	0 1 0
Porto Rico	0 0 8	0 1 3
Walnut, Italian	0 0 4	0 0 5

METALS.	£. s. d.	£. s. d.
IRON—Pig in Scotland ....ton	2 1 6	0 0 0
Bar, Welsh, in London....	4 15 0	5 2 6
„ „ in Wales	4 7 6	4 12 6
„ Staffordshire, London	6 0 0	7 0 0
Sheets, single, in London....	7 10 0	9 0 0
Hoops „	6 10 0	7 10 0
Nail-rods „	6 0 0	7 0 0
COPPER—		
British, cke. and ingt. ....ton	45 10 0	46 10 0
Best selected	47 0 0	48 0 0
Sheets, strong....	55 10 0	56 0 0
„ India	52 0 0	53 0 0
Australian, fine cash....	0 0 0	0 0 0
Chili, bars „	42 17 6	43 5 0
YELLOW METAL....lb.	0 0 4½	0 0 4¾
LEAD—Pig, Spanish	11 5 0	0 0 0
English, com. brands	11 12 6	0 0 0
SPELTER—		
Silesian, special ....ton	14 10 0	14 12 6
Ordinary brands	14 7 6	14 10 0
TIN—		
Straits	92 0 0	92 10 0
Australian	92 2 6	92 12 6
English ingots....	93 0 0	0 0 0
TINPLATES—		
IC coke ....box	14 6 0	16 6 0
IX ditto	21 0 0	25 0 0
IC charcoal	17 0 0	20 0 0
IX ditto	26 0 0	27 0 0
OILS.		
Linseed ....ton	22 5 0	22 17 6
Cocoanut, Cochin	32 0 0	0 0 0
Ceylon	27 0 0	0 0 0
Copra....	26 0 0	26 10 0
Palm, Lagos	30 0 0	0 0 0
Palm-nut Kernel	26 0 0	0 0 0
Rapeseed, English pale....	24 15 0	0 0 0
„ brown	22 15 0	23 0 0
Cottonseed, refined	21 10 0	23 0 0
Tallow and Oleine	25 0 0	45 0 0
Lubricating, U.S.	7 0 0	10 0 0
„ Refined	8 0 0	15 0 0
TURPENTINE—		
American, in cks. ....cwt.	1 6 6	1 6 9
TAR—Stockholm ....brl.	1 2 0	1 2 6
Archangel....	0 13 0	0 13 6

COMPETITIONS AND CONTRACTS.

Epitome of Advertisements in this Number.

COMPETITIONS.

Nature of Work.	By whom required.	Premium.	Designs to be delivered.	Page.
Designs for Public Abattoirs....	Birkenhead Corporation	Not stated	October 10th	ii.

CONTRACTS.

Nature of Work, or Materials.	By whom required.	Architect, Surveyor, or Engineer.	Tenders to be delivered.	Page.
School and Teachers' Residence	Hound School Board ...	F. A. Dovey	Sept. 17th	xviii.
Sewers, Manholes, &c....	Southgate Local Board	C. Griffin Lawton.....	Sept. 19th	ii.
New Streets Works	St. Giles, Camberwell...	*Official*	Sept. 21st	ii.
Paving and Road-making....	Beckenham Local Board	G. B. Carlton	do.	ii.
Renewing Water Mains, &c., Aldershot.....	War Department.....	*Official*	Sept. 22nd	ii.
Iron Sorting-Office at Ry. Statn, St. Leonards	Com. of H.M. Works...	do.	do.	ii.
Kerbing, Paving, &c., and Making-up Road...	Tottenham Local Board	— De Pape	do.	ii.
Concrete Invert within Sewage Works	do.	do.	do.	ii.
Well-Sinking	do.	do.	do.	ii.
Guernsey Granite and Pipe Sewer, &c.	Willesden Local Board	O. Claude Robson	do.	ii.
Cockle Stove	Holborn Union.....	H. Saxon Snell & Son	Sept. 23rd	xviii.
Painting, &c.	Lambeth Guardians ...	*Official*	do.	xviii.
Scavengers' Depot....	Com. of Sewers.....	do.	Sept. 25th	ii.
Sewerage Works	Wednesbury U.S.A. ...	E. Pritchard.....	Sept. 26th	ii.
Police-Station, Hounslow	Met. Police District ...	*Official*	Sept. 28th	ii.
Alterations to Post-Office, Wolverhampton ...	Com. of H.M. Works ...	do.	do.	ii.
Sewerage Works, Llantwit Lower	Neath R.S.A.	T. M. Price	do.	xviii.
Sewerage Works	Hereford Town Council	J. Parker	Sept. 29th	ii.
Partial Re-construction of House.....	W. Slark, Solicitor	.....	Not stated	xviii.
General Repairs to House	.....	T. K. Green & Son	do.	xviii.
Detached Residences, Brentwood.....	.....	Haltridge & Cubitt	do.	ii.

TENDERS.

ASHTON-UNDER-LYNE.—For house and shop at Hurst, for Mr. H. Schofield. Mr. J. H. Burton, architect, Ashton-under-Lyne :—

Geo. Parkinson, Manchester	£286 0 0
Davison & Carr, Manchester....	285 0 0
Castle-hall Saw Mills Co., Staleybridge	284 0 0
Allen Holmes, Ashton-under-Lyne ...	275 0 0
John Burton & Sons, Ashton-under-Lyne	270 0 0
S. Braithwaite, Ashton-under-Lyne ...	270 0 0
T. G. Shaw, Staleybridge	269 0 0
Jabez Gibson, Dukinfield....	260 0 0
George Barr, Ashton-under-Lyne	258 10 0
Rodger Willis, Ashton-under-Lyne ...	256 10 0
J. W. Williamson, Ashton-under-Lyne	256 0 0
Jas. Matland, Ashton-under-Lyne.....	255 10 0
Aaron Marsden, Ashton-under-Lyne..	252 0 0
Jas. Torkington, Ashton-under-Lyne	248 15 0
Walter Clough, Ashton-under-Lyne ...	248 0 0
Robert Irwin, Ashton-under-Lyne.....	245 0 0
William Neal, Ashton-under-Lyne.....	236 0 0
John Whatmough, Ashton-under-Lyne	225 10 0
Edward Kirkby, Ashton-under-Lyne..	213 0 0
Thomas Dean, Ashton-under-Lyne *...	212 10 0

* Accepted.

BLACKHEATH.—For the erection of four dwelling-houses and shops at Combe Farm-lane, Blackheath, for Mr. J. Murray. Mr. John Jas. Downes, architect, Lewisham High-road :—

Mark Redman, Brockley (accepted) £3,275 0 0

[The lowest tenderer in competition for four similar dwellings erected in 1884.]

BLACKHEATH.—For the erection of stables and coach-houses in rear of the above, for Mr. J. Murray. Mr. John Jas. Downes, architect :—

Mark Redman, Brockley (accepted) ... £340 0 0

[No competition.]

BURNLEY (Lancashire).—For alterations and extensions at the Keirby Brewery, for Mr. James Grimshaw. Mr. R. C. Sinclair, engineer and architect, 3, Adelaide-place, London Bridge. Quantities by Mr. Robey E. Carpenter, Burton-on-Trent :—

Excavator's, Mason's, and Waller's Work.

G. Smith....	£1,065 0 0
G. Cudworth	1,050 0 0
D. Laycock	1,008 0 0
E. Heap (accepted)....	935 0 0

Carpenter's and Joiner's Work.

H. Bracewell....	£550 0 0
Clegg & Son	348 0 0
R. Dean & Son....	265 0 0
R. Brown (accepted)	250 0 0

Slater's Work.

Whittaker & Schofield	£57 0 0
W. Stanforth (accepted)....	52 15 0

Plumber's, Painter's, and Glazier's Work.

Owen & Co.	£126 0 0
H. Lord (accepted)....	121 0 0

BUSHEY (Herts).—For erecting new Board-room, offices, engine-room, &c., at Bushey, for the Watford Gas Company. Mr. H. Jones, C.E., engineer. Quantities supplied by Mr. J. Rookwood :—

G. & J. Waterman, Watford * £1,247 0 0

* Accepted.

BUSHEY (Herts).—For alterations to cottage, for Mr. Thos. Beall. Mr. Charles P. Ayres, architect :—

T. Turner	£215 0 0
Judge & Eames....	198 0 0
Clifford & Gough (accepted)	198 0 0

[All of Watford.]

CLAPHAM.—For cottages in Priory Grove, for Mr. R. B. Summerford. Mr. Geo. Jackson, architect and surveyor, 31, Charing-cross :—

Tyerman, Walworth	£2,535 0 0
Holloway Bros., Battersea....	2,535 0 0
Humphris, Sutton (too late)....	2,500 0 0
Gregory, Clapham Junction....	2,397 0 0
Stride, South Lambeth	2,299 0 0
Johnson, Wandsworth-common *.....	2,200 0 0

* Accepted.

EAST HAM.—For four shops, Green-street, Plashet, East Ham, for Mr. G. Bethell. Mr. W. Bethell, architect :—

Parsons	£1,380 0 0
T. Baxter	1,365 0 0
T. Wyles (accepted)	1,325 0 0

HULL.—For the erection and completion of a fire brigade station, for the Corporation. Messrs. Starr & Cartwright, architects, Hull. Quantities supplied by the architects :—

Grasby....	£1,656 0 0
Sargeant....	1,648 0 0
Musgrave	1,645 0 0
Garbutt	1,635 0 0
Dalby & Son	1,600 0 0
Blackburn	1,558 0 0
Freeman....	1,555 12 6
Ling....	1,525 12 0
Southern....	1,486 0 0
Drury	1,477 10 0
Turner & Sangwin	1,475 0 7½
Harper (accepted)	1,463 10 6

ISLINGTON.—For additions and repairs at 13, Highbury-place, for Mr. R. M. Holborn. Mr. Thos. Williams, architect :—

Furrows	£379 0 0
Dixon	360 0 0
Andrews....	345 0 0
Dunford & Langham (accepted).....	325 0 0

LEE-ON-THE-SOLENT.—For a pair of semi-detached villas at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, architect :—

J. Cooper, Portsea	£667 0 0
J. Plummer, Fareham	650 0 0
A. Mower, Lee-on-the-Solent	640 0 0
Cording & Wheeler, Southsea*	620 0 0

* Accepted.

LEE-ON-THE-SOLENT.—For concrete pier abutment at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, architect :—

J. Plummer, Fareham	£320 0 0
Roe & Co., Southampton	285 0 0
J. Kingswell, Calbourne (accepted) ...	195 0 0

LEE-ON-THE-SOLENT.—For roads at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, surveyor :—

J. Kingswell, Calbourne (accepted) ... £220 0 0

LEE-ON-THE-SOLENT.—For two villa residences at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, architect :—

J. Plummer, Fareham (accepted) £680 0 0

LEE-ON-THE-SOLENT.—For a villa residence at Lee-on-the-Solent, for Mr. J. C. Robinson. Mr. J. E. Clifton, architect :—

A. Mower, Lee-on-the-Solent (accepted)... £340 0 0

LONDON.—For alterations at the Princess Charlotte Public-house, Prince's-street, Hanover-square, for Messrs. G. Warman & Co. Mr. W. T. Farthing, architect. Quantities supplied :—

		A.*
S. Belham & Son ...	£1,880 0 0	..... £60 0 0
W. S. Josolyne.....	1,750 0 0	..... 200 0 0
W. Scrivener & Co.	1,680 0 0	..... 110 0 0
Jackson & Todd ...	1,610 0 0	..... 123 0 0
A. Bolding	1,600 0 0	..... 95 0 0
J. Beale	1,557 0 0	..... 158 0 0
W. Royal	1,540 0 0	..... 58 0 0
F. W. Gill	1,487 0 0	..... 87 0 0
R. W. Edgley	1,470 0 0	..... 110 0 0
H. Pickersgill	1,460 0 0	..... 150 0 0
B. Cook	1,419 0 0	..... 57 0 0
Spencer & Co.†	1,400 0 0	..... 120 0 0

* Deduct if deal and four oils, instead of wainscot front.
† Accepted.

LONDON.—For repairs to schools and offices, Mile End Old Town Workhouse, Bancroft-road, Mile End. Mr. J. M. Knight, architect :—

Cocks	£918 0 0
Proctor	905 0 0
Lye	900 0 0
Thompson	895 0 0
Castle	887 0 0
H. B. Little, Devonshire-st., Bishopsgate (accepted)....	839 0 0

LONDON.—For alterations to No. 29, Chapel-street, Edgware-road. Mr. Robert Willey, architect, Ludgate-hill :—

J. Woodward, Finsbury	£714 0 0
Penny & Co., Ealing	625 0 0
Jones & Sons, Ealing....	590 0 0
W. Rhodes, Hyde Park....	572 0 0

LONDON.—For alterations to No 58, Gresham-street, for Messrs. Chartris Bros. Mr. Richard Peters, architect, Wool Exchange, Coleman-street :—

Watson	£461 19 0
Baldwin	440 0 0
Julian	386 0 0
Richardson Bros. (accepted)	335 0 0
Kemp	327 0 0

LONDON.—For re-instatement of No. 27, Leigh-street, Burton-crescent. Mr. J. Hamilton, architect:—

S. J. Scott	£320	0	0
W. Shurmur	297	0	0
S. Hayworth & Son	264	0	0
Woolveridge Bros.	235	0	0
G. Beaulands	175	15	0

LONDON.—For sanitary improvements and other alterations at No. 1, Prince's-gate, Hyde Park, for Mr. J. Francis Austen. Mr. Mark H. Judge, architect:—

Haward Bros. (accepted)	£327	0	0

LUTON.—For the erection of two houses, Melson-street, Luton, for Mr. A. Johnstone. Mr. A. E. Smith, architect, Luton:—

Slough	£1,225	0	0
Sanders	1,180	0	0
Rauch	1,140	0	0
Neville	1,125	0	0
Linfield	1,109	0	0
Cox (accepted)	900	0	0

POPLAR.—For erection of parsonage house and Sunday schools, East India-road, Poplar. Messrs. Spalding & Auld, architects:—

L. H. & R. Roberts	£6,212	0	0
Martin, Wells, & Co.	6,202	0	0
W. & F. Croaker	5,963	0	0
J. Woodward	5,890	0	0
W. Shurmur	5,881	0	0
J. Outhwaite & Son	5,689	0	0
Wall Bros.	5,668	0	0
Hearle & Son	5,592	0	0
Atherton & Latta	5,457	0	0

RIPLEY (near Derby).—For the erection of billiard-room, stable, and carriage-house, at Green-hill House, Ripley, for Mr. J. B. Slack. Mr. R. Argile, architect. Quantities supplied:—

	Section 1.			Section 2.		
Clower	£93	0	0	£45	0	0
Warren	112	14	0	394	6	0
Fletcher*	90	12	4	384	6	4

* Accepted for both sections.

SOUTHEND.—For road and sewer on the United Land Company's Estate at Southend:—

S. & J. Sanders	£335	0	0
A. Oliver	325	0	0
Wood & Co.	325	0	0
W. Schefield	320	0	0
Cuming & Bennett	315	0	0
W. Harris	314	0	0
W. Nicholls	275	0	0
J. B. Howard	269	19	6
J. W. Steward	265	0	0
G. Oseuton	263	0	0
R. Nicholson	259	0	0
J. Bullock (accepted)	255	5	1

STAMFORD-HILL (Middlesex).—For the erection of St. John's Church, Vartry-road, Stamford-hill, inclusive of boundary-walls and gates. Mr. Spencer W. Grant, architect, Finsbury-pavement. Quantities by Mr. C. W. Brooks:—

Downs, Walworth	£6,575	0	0
Wall Bros., Kentish Town	6,515	0	0
Williams & Son, Barnsbury	6,450	0	0
Dove Bros., Islington	6,150	0	0
Tongue, Plumstead	6,060	0	0
Shurmur, Clapton	5,985	0	0
Cox, Hackney	5,964	0	0
Smith & Sons, Norwood	5,777	0	0
Holloway, Lavender-hill	5,645	0	0

STAMFORD-HILL (Middlesex).—For the erection of new hall and rooms, for the Bible Christian Connexion. Mr. J. Kingwell Cole, architect, Mount-street, Grosvenor-square. Quantities by Mr. P. Pietersen. Messrs. Battam & Co., surveyors:—

J. H. Mills, Stamford-street	£2,049	0	0
W. W. T. Kelland, Stoke Newington	1,889	10	0
Dunford & Langham, Holloway	1,849	0	0
Benjamin Brown, Highbury	1,820	0	0
Paine Bros., Stamford-hill	1,700	0	0
Wall Bros., Kentish Town	1,653	0	0

SWANWICK (Derbyshire).—For the erection of store at Swanwick, for the Ripley Industrial Co-operative Society (Limited). Mr. R. Argile, architect, Ripley, Derby. Quantities supplied:—

Brentnall	£853	13	3
Clark	801	10	0
Warren	800	0	0
Roe & Son	672	12	9
Perry (accepted)	668	16	4

WATFORD (Herts).—For the erection of a cottage hospital in the Vicarage-road. Mr. Charles P. Ayres, architect, Watford:—

T. Turner	£1,894	0	0
W. B. Neal	1,852	0	0
Judge & Eames	1,740	0	0
Clifford & Gough	1,710	0	0
Andrews & Sons	1,697	0	0
G. Wiggs	1,687	0	0
H. S. Allen	1,685	0	0
G. & J. Waterman	1,574	0	0
H. W. Chadwick (accepted)	1,500	0	0

[All of Watford.]

WATFORD (Herts).—For the erection of stables, &c., St. John's-road, for Mr. Wm. George. Mr. Charles P. Ayres, architect:—

T. Turner	£350	0	0
Clifford & Gough	315	5	0
Chadwick (accepted)	302	0	0

[All of Watford.]

Sanitary Works at Royal Infirmary, Windsor.—Mr. J. Knight, of Marsham-street, Westminster, writes to say that his tender for these works (see p. 345, *ante*) was withdrawn.

SPECIAL NOTICE.—Lists of Tenders frequently reach us too late for insertion. They should be delivered at our Office, 46, Catherine-street, W.C., *not later than Four p.m.* on THURSDAYS.

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